ALCOA

WHEEL SERVICE MANUAL

AUGUST 2015

SUPERSEDES JANUARY 2012

IMPORTANT: Federal OSHA Regulations require all employers to make sure their employees who service rims/wheels understand the safety information contained in this manual. Do not let your employees service rims/wheels unless they are thoroughly trained and completely understand this safety information.

If you are a service technician do not service rims/wheels unless you are thoroughly trained and completely understand this safety information.

HEAVY & MEDIUM DUTY TRUCK | TRAILER | BUS | MOTOR HOME

ALCOA LIMITED WARRANTY

FOR MEDIUM DUTY TRUCKS, HEAVY DUTY TRUCKS, TRUCK TRAILERS, BUSES, RV and MOTORHOME WHEELS

This limited warranty applies to new Alcoa forged aluminum medium duty and heavy duty trucks, truck trailers, bus, RV or motorhome wheels ("Wheels") and the surface or rim flange treatments applied to the Wheels. "Transit Wheels" means Wheels used on transit vehicles, such as buses and vans, whose primary purpose is to transport people.

Alcoa warrants to the original purchaser who purchased a Wheel from Alcoa or Alcoa's authorized distributor that the Wheel is free from defects in material and workmanship for the applicable time period set forth below:

(a) Except as stated in (b) of this section, Wheels are warranted for 60 months from the date of manufacture as shown on the Wheel.

(b) Transit Wheels and RV and motorhome Wheels are warranted for 120 months from the date of manufacture as shown on the Wheel.

Alcoa agrees, without charge, to repair or replace a Wheel that fails in normal use or service (see the qualifications section below) because of defects in material and workmanship.

Alcoa warrants to the original purchaser and the end user of the Wheels from Alcoa or its authorized distributor the Dura-Flange® rim flange treatment against wear which creates a sharp edge that would require maintenance for 24 months from the date of manufacture as shown on the Wheel.

Alcoa warrants to the original purchaser and the end user of the Wheels from Alcoa or its authorized distributor the Dura-Bright® surface treatment against:

(i) filiform corrosion (worm or hair like lines, generally milky in appearance, underneath surface protective treatment and emanating from damage to the surface treatment such as nicks, scratches or damage from mounting hardware or wheel weights);

(ii) blistering due to loss of adhesion of the surface treatment; and

(iii) lift off of the surface treatment due to physical damage (nicks, scratches, gouges).

The foregoing Dura-Bright® surface treatment warranty is for the applicable period of time set forth below:

(a) Except as stated in (b) of this section, Dura-Bright® surface treatment on Wheels is warranted for 60 months from the date of manufacture as shown on the Wheel.

(b) Dura-Bright® surface treatment for RV and motorhome Wheels is warranted for 120 months from the date of manufacture as shown on the Wheel.

If the Dura-Flange® rim flange treatment or Dura-Bright® surface treatment fail in normal use or service (see the qualifications section below) to meet the foregoing warranties on any Wheel, Alcoa agrees, without charge, to replace the Wheel.

Qualifications: Alcoa does not warrant, and will not repair or replace or make adjustment, with respect to any Wheel or surface or rim flange treatment on such Wheel that has been subjected to misuse or abuse including any of the following:

(a) Using a tire which is oversized according to standards recommended by the Tire and Rim Association, Inc. or other recognized tire and rim agencies such as ETRTO (Europe);

(b) Loading the Wheel beyond the applicable maximum Wheel load as specified by Alcoa;

(c) Inflating tires beyond the applicable maximum as specified by Alcoa;

(d) Changing the original condition of the wheel by alteration or by subjecting it to any processing such as welding or straightening;

(e) Accidents or abnormal or severe operating conditions including without limitation tire fires, brake fires, severe brake system drags or seizures or running with a flat tire;

(f) Failure to follow maintenance, instructions or warnings set forth in the Alcoa Wheel Service Manual ("Service Manual"), Alcoa Technical Bulletins or other Alcoa literature. Recommended maintenance includes, without limitation, using proper torque, periodic cleaning, polishing, valve replacement, periodic inspection for damage and loose lug nuts and rim flange wear inspections and procedures;

(g) Nicks, scratches and other surface blemishes resulting from neglect, road salt, harsh conditions, improper maintenance, cleaning, road debris, curbing, accident or operation;

(h) Rim flange wear (unless the rim flange has been treated with Dura-Flange®);

(i) Using a spacer or adaptor of any kind;

(j) Damaging the surface during tire mounting and installation due to the use of improper tools or balancing with wheel weights; or

(k) Damage due to cleaning with abrasives, abrasive brushes, steel wool, scouring pads or strong chemicals (acids or alkaline).

THERE IS NO WARRANTY THAT THE WHEEL SHALL BE MERCHANTABLE OR FIT FOR ANY PARTICULAR PURPOSE, NOR IS THERE ANY OTHER WARRANTY, EXPRESS OR IMPLIED, EXCEPT SUCH AS IS EXPRESSLY SET FORTH HEREIN. ALCOA SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, INDIRECT OR SPECIAL DAMAGES FOR ANY BREACH OF WARRANTY. ALCOA'S LIABILITY AND THE PURCHASER'S EXCLUSIVE REMEDY IS LIMITED TO REPAIR OR REPLACEMENT OF THE WHEEL AS STATED IN THIS LIMITED WARRANTY.

This limited warranty should be used in conjunction with the Alcoa Wheel Service Manual and the Alcoa Dura-Bright® Wheels Cleaning Guide. The Service Manual contains important safety information and warnings. Failure to read and understand that information may result in serious injury or death. If you do not have copies of the Service Manual you may obtain copies free of charge at www.alcoawheels.com or by contacting Alcoa Wheel and Transportation Products at (800) 242-9898 or the address below:

Alcoa Wheel and Transportation Products

1616 Harvard Avenue

Cleveland, OH 44105

WARNING Wheels that are not properly installed or maintained may not be safe.

Failure to follow proper wheel installation or maintenance practices may result in injury or death.

Follow the proper wheel installation and maintenance practices as contained in this Alcoa Service Manual. For additional copies of the manual and other useful items listed below, available free of charge, or for the most recent updates, contact Alcoa Wheel and Transportation Products at 1-800-242-9898 or on the web at www.alcoawheels.com.

To obtain information on free training on proper installation and maintenance procedures, contact Alcoa Wheel Products at 800-242-9898 or on the web at www.alcoawheels.com.

Publications available free from Alcoa:

- Alcoa Wheel Service Manual
- Dura-Bright® Wheels Cleaning Guide
- Maintaining Alcoa Aluminum Wheels Rim Flange Wear
- Transit Hub Bore Gage

Safety Training Videos available online at www.alcoawheels.com:

- Proper Wheel Maintenance
- Disc Wheel Inspection (TIA)
- Wheel and Tire Safety: "Everybody's Job"

Information available through industry and government organizations:

TIA (Tire Industry Association)
Info available at www.tireindustry.org
or 301-430-7280

RMA (Rubber Manufacturers Association)
Info available at www.rma.org/tire-safety
or 202-682-4800

OSHA (Occupational Safety and Health Administration) of US government
Info available at www.osha.gov
or 800-321-OSHA

TMC (Technology & Maintenance Council)
Info available at tmc.trucking.org
or 703-838-1763

DOT (U.S. Department of Transportation)
Info available at www.transportation.gov
or 855-368-4200

Table of Contents

How to use this manual

This manual is written in a style called structured text.

Throughout the manual you will find numbers which look like this (See Section 3-1). These numbers are cross references to other sections of the manual. The numbers (3-1) refer to section 3, subtopic 1. You will find the section number and subtopic number under the heading in each section.

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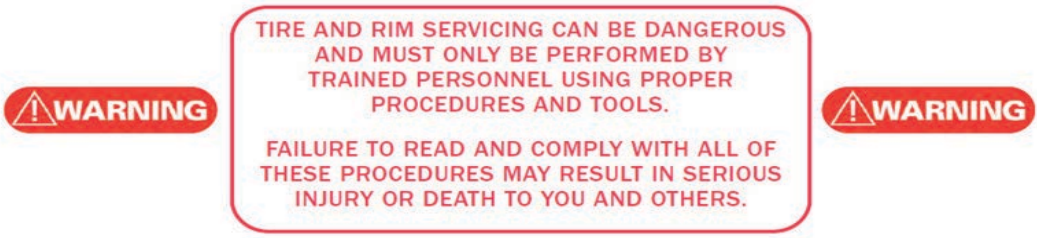
1 Safety

WARNING An inflated tire and wheel assembly contains enough air pressure to cause an explosive separation.

Unsafe handling or failure to follow approved mounting and demounting procedures can lead to serious injury or death.

Study, understand and follow the procedures contained in this manual to ensure your safety.


WARNING
TIRE AND RIM SERVICING CAN BE DANGEROUS AND MUST ONLY BE PERFORMED BY TRAINED PERSONNEL USING PROPER PROCEDURES AND TOOLS.
FAILURE TO READ AND COMPLY WITH ALL OF THESE PROCEDURES MAY RESULT IN SERIOUS INJURY OR DEATH TO YOU AND OTHERS.
WARNING

Safety is serious business. All tire shops must know and follow OSHA work regulations... no matter how small the shop. Under U.S. federal law any individual handling tire/wheel assemblies must be trained in OSHA regulations as mentioned in section 6 prior to servicing/handling truck tire and wheel assembly.

Safety is everybody's business. Do not attempt to service any wheel assembly without proper training.

Proper equipment is important. Be sure you have the recommended tools and equipment on hand and use them according to manufacturer's instructions.

Tubeless wheels and tires require equal care. Even though tubeless assemblies have fewer parts than multi-piece wheels, they still require respect and proper handling.

Pay particular attention during crucial steps:

- Removal of tire and wheel assemblies from vehicles
- Demounting tires from wheels
- Wheel inspections
- Inflation of tires
- Handling and storing of inflated tire and wheel assemblies

Safety and service information is readily available. Wheel, tire and service equipment manufacturers offer service manuals and other training materials. Stay up to date on proper procedures and keep current instructional materials handy in the shop. Study safety and service information and use it on the job.

Completely deflate any tire by removing the valve core before removing the tire/wheel assembly from the axle if there is known or suspected damage to the tire or wheel or if the tire has been operated at 80% or less of its recommended operating pressure. Demount, inspect and match all tire and rim parts before re-inflating in a restraining device.

NEVER use starter fluid, propane, ether, gasoline, or other flammable materials and/or accelerants to lubricate the beads and or seat of a tire. This practice can cause the explosive separation of the tire/wheel during servicing or during highway use, which may result in serious injury or death.

NEVER inflate beyond 40 psi to seat any tire beads.

NEVER stand, lean, or reach over the tire rim/wheel assembly in the restraining device during inflation. Even if a tire is in a restraining device, inflating beyond 40 psi when trying to seat the beads is a **DANGEROUS PRACTICE** that may break a tire bead or the rim/wheel with explosive force and possibly result in serious injury or death.

Any inflated tire mounted on a wheel contains explosive energy. The use of damaged, mismatched or improperly assembled tire and wheel components can cause the assembly to separate with explosive force. If struck by an exploding tire, wheel component, or the air blast, you or someone else may be seriously injured or killed.

Mismatching tire and rim diameters is dangerous. A mismatched tire and rim assembly may separate and can result in serious injury or death. This warning applies to 15" and 15.5", 16" and 16.5", 17" and 17.5", 22" and 22.5", 24" and 24.5" tire and rim assemblies as well as other sized assemblies.

NEVER assemble a tire and rim unless you have positively identified and correctly matched the tire and rim diameter.

If an attempt is made to seat the tire bead by inflating on a mismatched rim/wheel, the tire bead will break with explosive force and may result in serious injury or death.

ALWAYS comply with the procedures in the tire/wheel manufacturer's catalogs, instruction manuals or other industry and government instructional materials.

Use a non-flammable vegetable or soap-based rubber lubricant on the beads and rim surfaces. Lubricate tire/wheel beads to make tire demounting and mounting easier and seat the beads properly.

Use the proper tools to demount or mount tires and rims (refer to "Typical Tire Service Tools"). **NEVER** strike the tire/wheel assembly with a steel duck bill hammer to unseat the beads and do not strike the head of the hammer with another hard-faced hammer – use a rubber mallet or plastic dead blow hammer. Slide impact bead unseating tools are the preferred tools for unseating beads on tubeless tires.

NEVER reinflate any tire that has been operated in a run-flat or underinflated condition (i.e., operated at 80% or less of recommended operating pressure). Demount, inspect and match all tire and rim components before reinflating in a restraining device with the valve core
removed.

If an emergency puncture repair inflater was used on a tubeless tire, deflate and reinflate the tire several times to remove potentially explosive propellant before servicing the tire.

Statistics show that in most industries, at worst only one in 1000 serious accidents results in a fatality, but when the accident involves tire and wheels, statistically one in every 10 serious accidents is a fatality. That is 100 times more often than in most other industries.

WARNING
IF YOU DO NOT KNOW HOW TO USE TIRE SERVICING TOOLS — STOP!
TIRE SERVICING MUST ONLY BE PERFORMED BY TRAINED PERSONNEL.
FAILURE TO FOLLOW PROPER PROCEDURES CAN RESULT IN SERIOUS INJURY OR DEATH.
• ALWAYS wear adequate protective eyewear (or face shield), protective footwear, and ear protection while servicing tires to avoid injury.
• NEVER use a tire tool for anything except demounting and mounting tires.
• NEVER use an extension or "cheater" bar with tire irons.
• ALWAYS use soft-faced hammers when driving tire irons or assembling components.
• NEVER use a hammer with a loose or cracked handle.
• NEVER use a bent, cracked, chipped, dented or mushroomed tool. Keep tools clean and inspect them frequently.
• NEVER alter or apply heat to any tire service tool.
Typical Tire Service Tools
Use only tools recommended by the tire or wheel manufacturer.
Restraining Devices
Shop
Bead Unseating Tools
Rim Mallets
Soft-Faced Dead Blow Hammer
Plastic Faced
Tubeless Tire Iron Set
Brass
Rubber
Clip-on Chuck/In-Line Gauge. Use sufficient hose length to maintain safe distance during inflation. Stay out of the trajectory.
Farm/OTR
Portable
ALWAYS WEAR SAFETY GLASSES

Source: OSHA 3421-10N 2011

NOTICE: For information on tube type wheels, contact Alcoa at (800) 242-9898 Option 1.

2 Deflating and Demounting Tubeless Truck & Bus Tires

ALWAYS completely deflate the tire assembly before attempting to demount a tire from a tire/wheel assembly. Remove the valve core and insert a wire down the valve stem to ensure complete deflation.

NEVER demount a tire from a rim unless it is completely deflated.

Lubricate the beads of the tire and bead seat of the wheel. Then use a slide impact bead unseating tool, duck bill hammer with a rubber mallet, or other bead unseating tools. Both beads must be loosened before demounting a tire.

For aluminum wheels, a mat should be placed on the floor to prevent damage to the mounting surface of the wheel.

Figures 2-1 through 2-3. **Identify the short side of the drop center wheel well.** Single piece tubeless rims and wheels must be demounted from the short side of the drop center well. On steel disc wheels, the short side is typically located opposite the disc. Aluminum wheels typically have symmetrical drop centers so tires can be demounted from either side. However, on certain non-symmetrical aluminum wheels, the short side of the drop center well is located on the disc side.

Figure 2-4. **Lubricate and unseat both beads in the bead seat area of the tire and wheel.** Position the assembly with the short side of the drop center well facing up.

Figure 2-5. **Insert tire irons** on either side of the valve stem approximately 6 inches (152 mm) apart. Pry the top bead over the rim flange and force the bead opposite the tire irons in the drop center well.

Figure 2-6. **Remove one tire iron and insert the curved end between the bead and rim.** Pry the rest of the top bead over the rim flange. Repeat this process until the first bead is entirely free from the rim.

Figure 2-7. **Stand the tire on its tread.** Slide the flat end of the tire iron between the bead and the rim flange; make sure the tip is completely over the rim flange.

Figure 2-8. **Pry the tire iron and allow the rim/wheel to drop. IMPORTANT! Make sure your feet are clear of the rim.** If necessary, rock or bounce the assembly to remove the tire from the tire/wheel.

3 Inspection and Maintenance

Inspect thoroughly and frequently

3-1

Safe operation requires thorough examination of wheels and attaching hardware, at frequent intervals, both on and off the vehicle.

Wheels that are in service need to be inspected at regular intervals to ensure proper and safe performance.

It is not always possible to predict the useful life of a wheel. Wheels eventually wear out, but generally, older wheels and wheels operating in extreme conditions should be examined more frequently for obvious signs they should be removed from service.

Examine all exposed areas frequently. Clean wheels and look for cracks, corrosion, wear or other damage. Also check the inner dualed wheel when the outer wheel is removed.

During tire changes, thoroughly examine the entire wheel. Pay particular attention to the rim contour and the surfaces of the rim.

Hidden Damage

Do not exceed maximum wheel load. Users must compare OEM vehicle load ratings to maximum wheel load ratings and inflation pressures which are roll-stamped onto the wheel. See Section 3-12.

Do not overinflate a tire/wheel assembly. Use the tire/wheel manufacturer's recommended pressure, and under no circumstances exceed the cold tire/wheel pressures as listed by the tire/wheel manufacturer which is moulded/stamped on the tire and wheel. Before mounting the tire, perform a wheel fitment check to ensure proper clearance from any obstructions.

Wheel damage can be hidden beneath the tire, so whenever a tire is removed, thoroughly examine the complete wheel. Remove all grease and road dirt. Use a wire brush or steel wool to remove rubber from the bead seats.

Wheel alteration

3-2

Alcoa does not approve of any form of alteration to wheels except minor cosmetic buffing for appearance purposes. Sanding and/or grinding is permitted to properly maintain the rim flange area of the wheel.

Welding, brazing or other heat application must never be used to repair or straighten a wheel. Use of adapter plates or bead-locks are not approved on Alcoa wheels.

Alcoa wheels should not be painted or otherwise coated in any way that may interfere with the mounting surfaces.

Any wheels that show signs of alteration should be removed from service and scrapped.

The wheel identification required by DOT is stamped on all wheels. Wheels must be taken out of service if this identification is not legible.

WARNING

WARNING Welding, brazing or otherwise heating any area of an Alcoa aluminum wheel will weaken the wheel. Weakened or damaged wheels can lead to an explosive separation of tires and wheels or wheel failure on the vehicle.

Explosive separations of tires and wheels or wheel failure on the vehicle could cause serious injuries or death.

Never attempt to weld, braze or heat any surface of an Alcoa aluminum wheel.

Heat damage

3-3

WARNING

WARNING Excessive heat from fire, brake malfunction, wheel bearing failure, tire failure or other sources may weaken the metal and cause the wheel/tire assembly to separate explosively.

Exploding tire/wheel assemblies can cause serious injury or death.

Immediately and permanently remove from service any wheel that has been exposed to excessive heat.

Wheels must be inspected for exposure to excessive heat before being returned to service. A wheel that has been subjected to excessive heat may appear charred or burned, or may appear to be in good condition if it has been cleaned. Do not use any wheel that has been overheated regardless of appearance. Even if a wheel does not appear to be obviously burned, inspect the labels, tire bead, brake drum and high temperature nylon spacer for evidence of charring, melting, blistering or burning. Any wheel run with a flat tire longer than the time necessary to immediately pull off the road should be checked for excessive heat damage.

A wheel may discolor from excessive heat. It can appear a dull grayish color and will not polish to a bright finish as an undamaged Alcoa wheel would.

3

Figure 3-1

Charred sticker (prior to 2009)

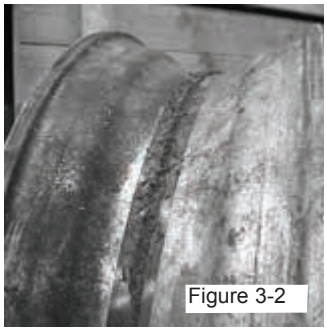


Figure 3-2

Discoloration of Wheel with charred rubber

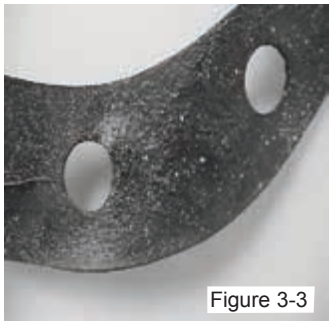


Figure 3-3

Charred high temperature nylon spacer

Starting in January 2009 the new Alcoa Logo may not show heat damage. Inspect all axle end components for signs of exposure to excessive heat. Check the brake drums (Disc Pads on discs), high temperature nylon spacer and tire beads for heat damage. If these components show signs of over heating, the entire assembly, including the wheel, should be replaced. A blistered, charred, blackened or cracked-looking logo decal on an Alcoa wheel may indicate that the wheel has been exposed to excessive heat as shown in picture (Figure 3-1), or discoloration as shown in (Figure 3-4).

Wheels manufactured starting in January 2009 will have a 1 inch clear round heat indicator located next to the roll stamp on the inside shown in Figures 3-4/3-5, along with the same 1 inch clear round heat indicator located on the tire side drop well as shown in Figure 3-6.

If either of these round labels show signs of blistering, or have a charred, blackened, or cracked appearance, this may indicate the wheel has been exposed to excessive heat.

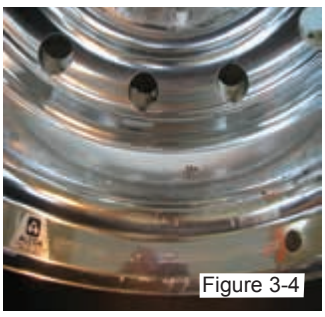


Figure 3-4

Charred Heat Indicator (2009 and after)

Figure 3-5

Charred Heat Indicator (2009 and after)

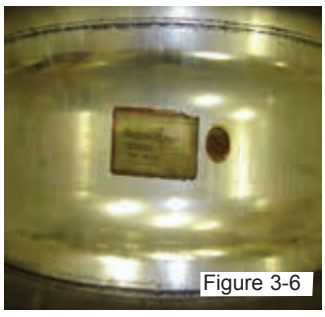


Figure 3-6

Charred Heat Indicator (2009 and after)

IF ANY OF THE ABOVE CONDITIONS ARE SEEN, REMOVE THE WHEEL FROM SERVICE IMMEDIATELY AND PERFORM DIMENSIONAL CHECKS PER SECTION 3-4. THIS INCLUDES ANY HEAT DAMAGE TO THE TIRE, DISCOLORATION TO THE WHEEL, AND OR BRAKE DRUM, AND ANY BURNT OR CHARRED LABELS.

Dimensional checks

3-4

Dimension, Heat Damage and other checks

WARNING Wheels that have been subjected to high pressure tire and rim separation or excessive heat damage may no longer have sufficient dimension and contour to retain the tire bead while under pressure.

Exploding tire/wheel assembly can cause serious injury or death.

Immediately and permanently remove from service any wheel that has been exposed to high pressure tire/wheel separation or excessive heat.

WARNING Wheels that have been run flat or have other physical damage may no longer have sufficient dimension and contour to retain the tire bead while under pressure.

Rims that lack proper dimension and contour can have an explosive separation of the tire and rim, causing serious injury or death.

Any wheel that has been in service must be inspected prior to mounting. Follow the procedures for dimensional checks described in this section during each wheel inspection.

3

Best Inspection Method

Figure 3-7 shows the TRA Ball Tape

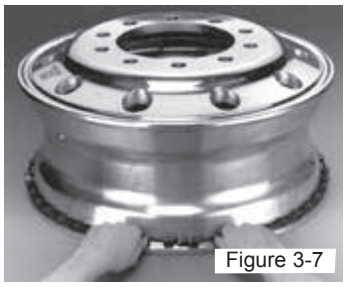


Figure 3-7

Measure the circumference of the bead seat on the open side (Figure 3-7) with a ball tape. All wheels should be inspected prior to mounting.

The circumference of the bead seat on the open side of the wheel should be checked at each tire change. The open side is the side opposite the disc face. In the case of center flange wide base wheels, or wheels with insets less than 3 inches, both rim flanges should be checked. If the circumference of the bead seat does not match the required dimension as indicated by the TRA certified ball tape, immediately and permanently remove the wheel from service.

Ball tapes used for measuring wheel circumference can be purchased from the Tire and Rim Association, Inc., 175 Montrose West Avenue, Copley, Ohio 44321, (330) 666-8121 www.us-tra.org. For instructions on the proper use of ball tape, reference the current Tire and Rim Association yearbook.

2nd Best Inspection Method

If a ball tape is unavailable

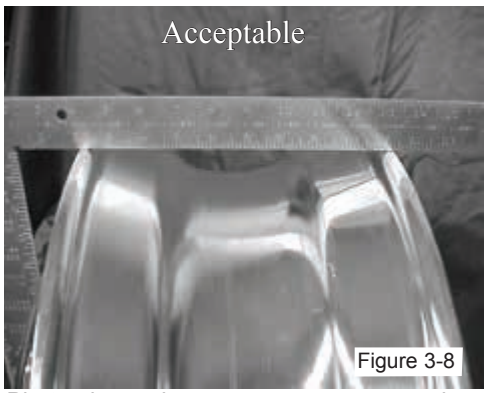


Figure 3-8

Photo above shows a carpenter square that is contacting both bead seats.

Dual wheel

Non-Dual wheel

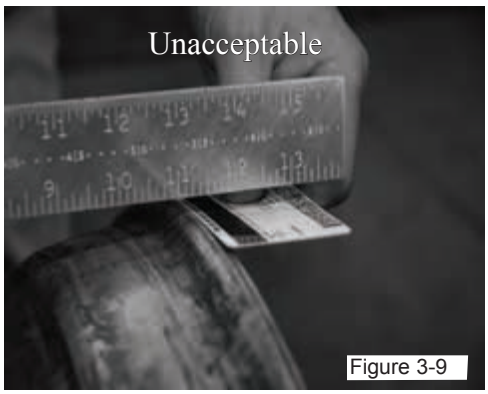


Figure 3-9

Photo above shows an undersized wheel that you can easily place a credit card (approximately .030 in. or .76mm) between the square and the wheel.

THIS INSPECTION TECHNIQUE ONLY APPLIES TO DUAL OR DISC FACED WHEELS

Check all wheels at each tire change for proper contour of the open side of the rim. Place the long leg of a carpenters square across the center of the disc side of the wheel. Extend the short leg across both rim flanges of the wheel as shown above. Repeat this process at four equidistant points around the wheel.

The short leg should touch both rim flanges at each point. If a space greater than the thickness of a credit card (or .030 in. or .76mm feeler gauge) appears between the short leg and the rim flange opposite the disc, the wheel should be removed from service and scrapped.

3rd Best Inspection Method

Rolling wheel as described on this page.

If a ball tape or carpenters square is unavailable, roll the unmounted wheel a minimum of 10 feet over a smooth, flat, level, clean surface such as asphalt or concrete pavement. Any deviation from rolling in a straight line is an indication of a deformed rim contour. Remove the wheel from service until it can be properly checked with a ball tape.

IF YOU DO NOT FULLY UNDERSTAND ANY OF THESE INSPECTION METHODS AS DESCRIBED IN THIS SECTION CONTACT ALCOA AT 800-242-9898 FOR CLARIFICATION. (TMC RP 247)

Tire Wear or Ride Problems

3-5

If you experience tire wear or ride problems it may be helpful to check radial run out. Remove the wheel from the vehicle, deflate and remove the tire (see Section 2, for recommendations and instructions for demounting tubeless tires).

Remount the wheel on the vehicle or balance without the tire. Be sure to follow proper installation procedures to assure the wheel is properly centered on the hub. Place a dial indicator as illustrated in Figure 3-10 to trace the bead seats of the wheel. Rotate the wheel noting the amount of variation shown on the dial indicator. Note: Alcoa aluminum wheels should be tested for radial run out only at the bead seat surface. A total indicator reading of .030 inches or less is acceptable.

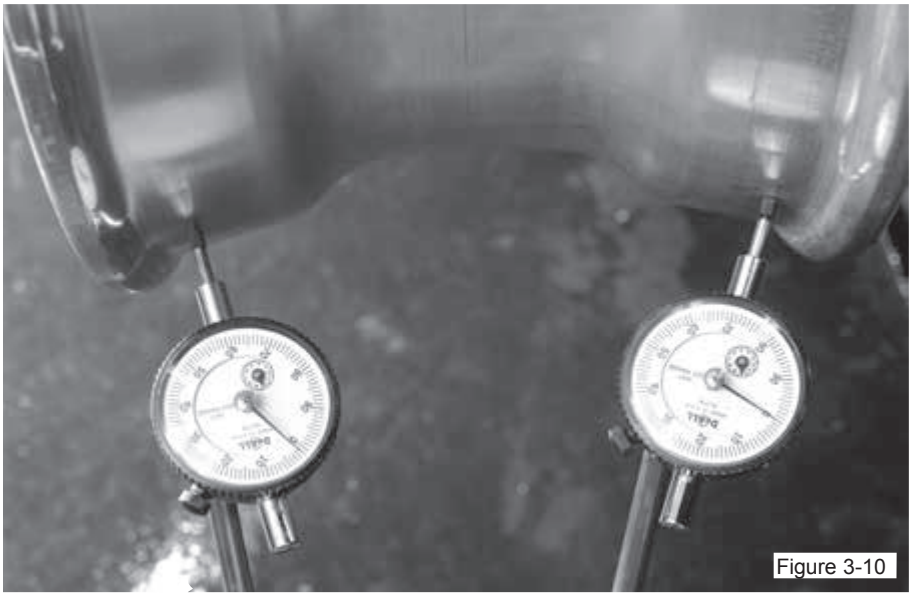


Figure 3-10

Inspect tire mounting according to instructions.

Tire wear can also be caused by improperly seated tires. Inspect the tire for proper seating on the wheel if the tire beads are not seated properly. Remove the wheel from the vehicle, deflate and break the bead seats (see Section 2 for recommendations and instructions for demounting tubeless tires). Adequately lubricate the tire/wheel bead seats and properly re-seat the tire beads. Reinflate the tire in a restraining device. Refer to OSHA rule 1910.177, paragraph b. See Section 6.

Cracked or damaged wheel checks

3-6

WARNING

WARNING Cracked or damaged wheels may fail and come off the vehicle.

Wheels that fail or come off the vehicle while it is moving can cause serious injury or death.

Immediately and permanently remove cracked or damaged wheels from service.

Visually inspect wheels for cracks or damage. Remove wheels from service with known or suspected damage. Reference Sections 3-7 thru 3-10.

Mounting area

3-7

Bolt hole cracks are usually caused by improper torquing (see Section 5-5), excessive loading or insufficient mounting flange support by the hub or brake drum. Remove wheel from service and scrap.

Figures 3-11and 3-12 are cracks starting from the bolt hole. Causes are: undersized diameter of wheel support surface (see specifications on next page), support surface not flat, incorrect attachment parts and insufficient torque (see Section 5-11). Remove wheel from service and scrap.

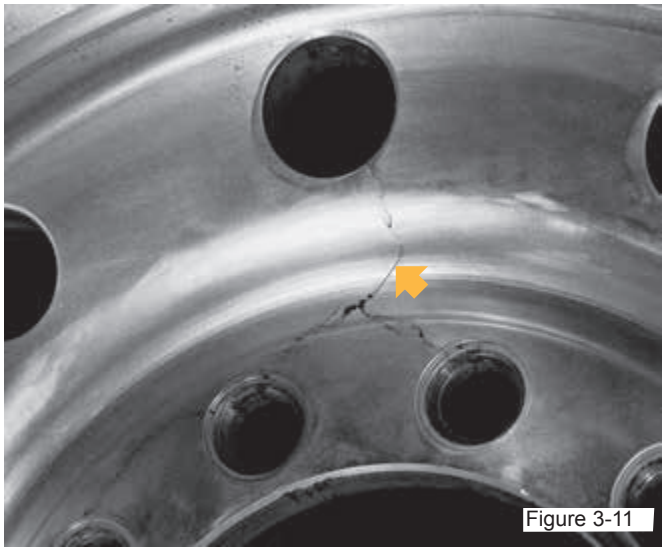


Figure 3-11

Figure 3-12

Inspect the hub/drum contact area thoroughly for cracks or other damage.

Support surface diameters

Support surface should be flat and match the diameter recommended in Chart 3-1 or 3-2.

Chart 3-1: ISO 4107

STUDS	BOLT CIRCLE	MOUNTING TYPE	MIN. DISC FLAT CLEARANCE DIAMETER	STUD SIZE
6	205 mm	HUB	255 mm	18 mm
8	222.25mm	HUB	280 mm	20 mm
8	275 mm	HUB	325 mm	20 mm
10	285.75 mm	HUB	345 mm	22 mm
10	335 mm	HUB	390 mm	22 mm

Chart 3-2: SAE J694

STUDS	BOLT CIRCLE	MOUNTING TYPE	MIN. DISC FLAT CLEARANCE DIAMETER	STUD SIZE
6	205 mm	HUB	255 mm	18 mm
8	6.5"	HUB	8.30"	.563"
8	275 mm	HUB	345 mm	22 mm
8	225.25 mm	HUB	280 mm	20 mm
8	275 mm	HUB	325 mm	20 mm
10	8.75"	STUD	11.32"	.750"/1.125"
10	285.75 mm	HUB	345 mm	22 mm
10	11.25"	HUB	13.56"	.875"
10	11.25"	STUD	13.56"	.750"/1.125"
10	335 mm	HUB	390 mm	22 mm

Bolt holes

Check bolt holes for enlargement, and elongation, and any damage which can occur if the wheel nuts are not kept tight. Dirt streaks or rust radiating from stud holes may indicate loose wheel nuts.

3-8

If wheels are run loose, both stud piloted wheels and hub piloted wheels can be damaged. Look for wallowed out or elongated ball seats on stud piloted wheels. On hub piloted wheels look for elongated stud holes. Over torquing can lead to damaged ball seats on stud piloted wheels and can damage the disc surface of hub piloted wheels. Remove damaged wheels from service and scrap.

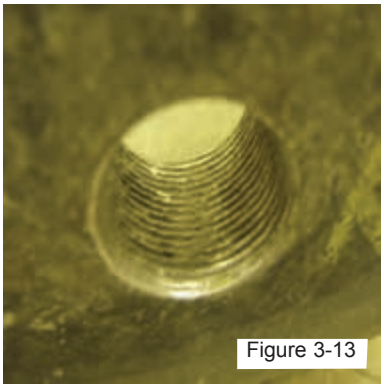


Figure 3-13

UNACCEPTABLE

For hub piloted wheels, visible thread marks on the inside of the stud holes indicate the wheel ran loose.

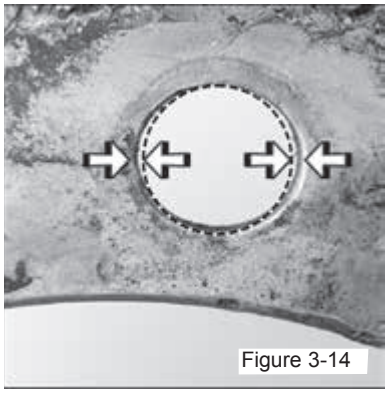


Figure 3-14

UNACCEPTABLE

For hub piloted wheels, a wallowed out stud hole indicates the wheel ran loose.

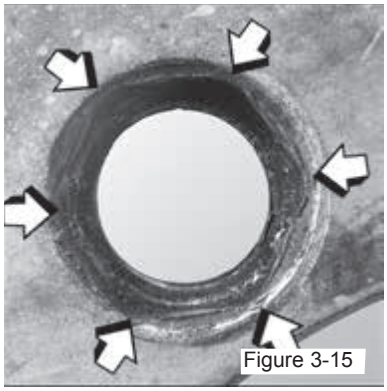


Figure 3-15

UNACCEPTABLE

For stud piloted wheels, a damaged ball seat contact area indicates the wheel ran loose.

Disc area

Inspect both sides of disc area for hand hole cracks. Remove damaged wheels from service and scrap.

3-9

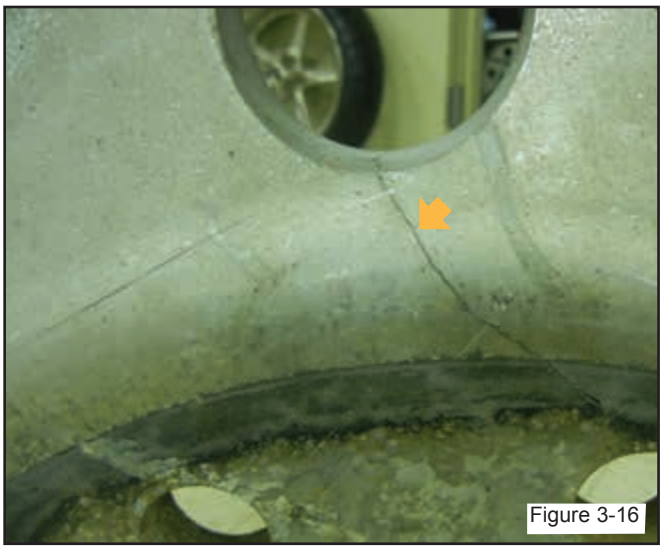


Figure 3-16

Hand Hole crack/Hand Hole to Nave

Exceeding wheel load capacity or damage to the Hand Hole can lead to cracks in the disc area. Remove wheel from service and scrap.

Rim Area (Drop Center, Valve Hole, and Bead Seat)

Check the entire rim area for nicks, gouges and cracks. Loss of air may be caused by cracks in areas throughout the drop center, around the valve hole, and in the bead seat area. Remove the damaged wheel from service and scrap.

3-10

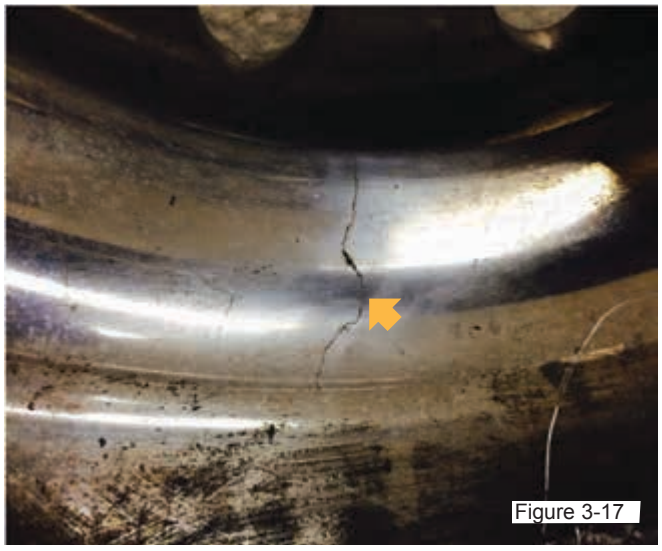


Figure 3-17

Drop Center crack

Drop center cracks are normally caused by exceeding load or inflation capacity, or corrosion from excessive air line moisture or improper tire mounting lubricants. Alcoa recommends Severe Service® wheels if the issue is overload or significant travel on unimproved roads. Please see Alcoa Wheels Product Spec Guide for part numbers and wheel descriptions of the Severe Service® wheels. Permanently remove damaged wheel from service and scrap.

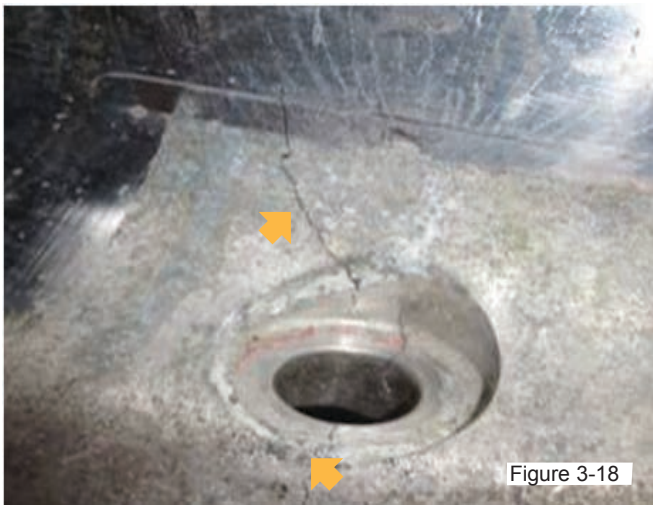


Figure 3-18

Valve Hole crack

Valve hole cracks are normally caused by exceeding load or inflation capacity, rough finish on the valve hole surface, over-torquing of the valve nut, or corrosion. Permanently remove damaged wheel from service and scrap.

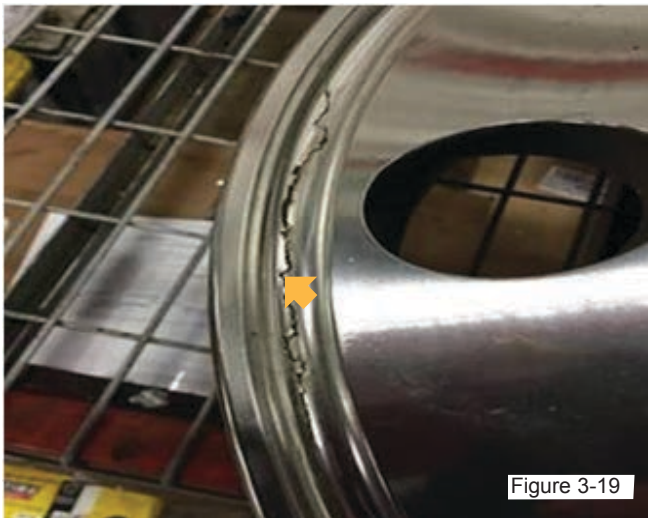


Figure 3-19

Bead Seat crack

Bead seat cracks may be caused by exceeding load or inflation capacity, improper manufacturing, tire tool damage, damage by hammer, impact damage, or rim is too narrow for the tire. Immediately and permanently remove damaged wheel from service and scrap.

Valves

3-11

It is recommended that valve stems be replaced at every tire change.

Replacement valves may be obtained from your authorized Alcoa Wheel Distributor. Metal valve stem caps are required per DOT instead of plastic. DO NOT USE RUBBER GROMMETS OR O - RINGS. DO NOT USE UNPLATED BRASS VALVES.

When replacing valve stems, it is recommended that the threads and O-ring or grommet be lubricated with a non-water based tire lubricant. Use silicone, viton or EPDM grommets.

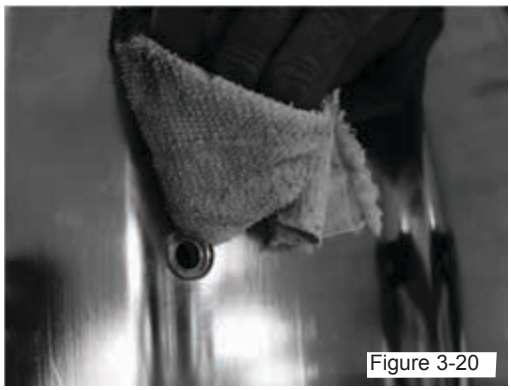


Figure 3-20

Clean the valve seat and valve hole thoroughly after removal of the valve. Remove all dirt, grease and oxidation. Make sure all contact areas are dry. Check for sharp edges or burrs. Remove with fine emery cloth if found.

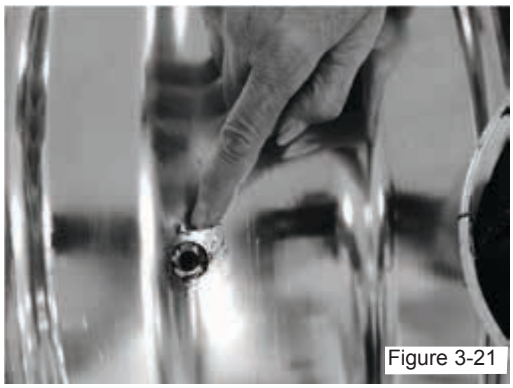


Figure 3-21

Apply a layer of non-water based tire lubricant in the valve hole and the outer and inner side wheel surface, up to 1” inch or 2 centimeters in diameter around the valve hole.

Figure 3-22

Before installing the valve, apply a thin coat of non-water based tire lubricant on the shaft and base of the valve stem where the O-ring or grommet is located. Do not use any other lubricants that are water-based or contain metals.

Alcoa recommends valve stem torque 9 to 11 ft-lbs, (12 to 15 Nm).

Refer to OEM Specifications for TPMS valves.

Valve Extensions

Alcoa distributors offer different valve extensions. A quality extension of 150 mm (6 inches) will enable tire pressure checks and adjustment of the inner tire of a regular dual fitment.

A valve stem stabilizer must be used if metal valve extensions are used. The mass of metal valve extensions and rotation may cause forces that can lead to cracks in the valve hole area of the wheel or the valve stem.

Only use plastic valve extensions obtained from your authorized Alcoa Wheel Distributor.

Identification

3-12

Since 1977, all Alcoa aluminum disc wheels have been identified with a stamping that shows the wheel load rating, maximum inflation pressure, date of manufacture, part number, wheel description and DOT marking designation. See Chart 3-3 and Figure 3-23.

Prior to June 1996, all Alcoa heavy duty truck wheels had the Alcoa identification symbol on the outside of the disc near the hand hole in line with the valve location. This marking was phased out on heavy duty truck wheels manufactured after June 1996.

Alcoa wheel identification is usually located 180 degrees from the valve stem on the open side of the wheel. Wheel identification required by the DOT must be legible. Wheels should be taken out of service if this identification is not legible and scrapped.

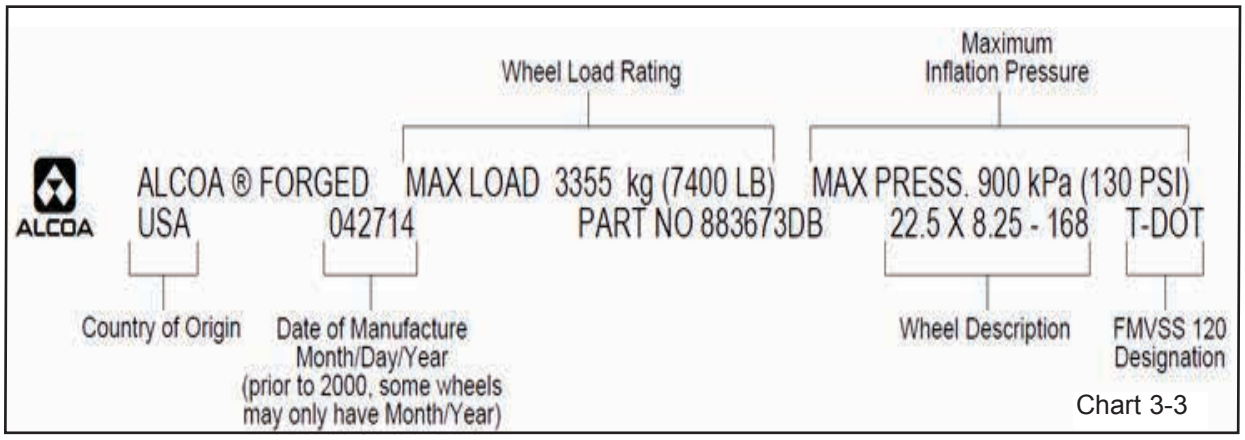

Wheel Load Rating
Maximum Inflation Pressure
ALCOA
ALCOA ® FORGED MAX LOAD 3355 kg (7400 LB) MAX PRESS. 900 kPa (130 PSI)
USA 042714 PART NO 883673DB 22.5 X 8.25 - 168 T-DOT
Country of Origin
Date of Manufacture Month/Day/Year (prior to 2000, some wheels may only have Month/Year)
Wheel Description
FMVSS 120 Designation

Chart 3-3

Figure 3-23

Alcoa wheels may have markings in the rollstamp to designate certification in other regions as follows:

- Wheels approved by INMETRO, the Instituto Nacional de Metrologia, are designated with the symbol.
- Wheels approved by the Japanese Ministry of Transportation, are designated with the symbol.

All Dura-Bright® surface treated wheels are designated by the letters “DB” following the part number such as 883671DB.

Note: Dura-Bright® wheels produced after November 2002 have Alcoa wheel part numbers ending with “DB” (earlier wheels have part numbers ending in a 4 or 7). Not all Alcoa wheels are available with the Dura-Bright® surface treatment.

All Dura-Flange® wheels are designated by the letters “DF” following the part number such as 883677DF.

All Dura-Bright® / Dura-Flange® wheels are designated by the letters “DD” following the part number such as 883673DD.

Alcoa introduced a new logo label in January 2009.

Owner/in-service identification

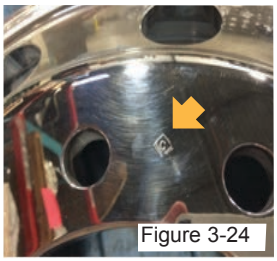


Figure 3-24

Some fleets mark their names and/or in-service date. When marking wheels use the following guide lines.

1. Use “Lo-Stress” stamps or equivalent.
2. Stamp on outside disc should be placed near the center bore.
3. Stamps on rim should be as close to the roll stamp as possible.

Note: Use of an impression stamp on Dura-Bright® surface treated wheels may affect the appearance and performance of the Dura-Bright® surface treatment in the area around the stamp.

Rim flange wear

Rim flange wear is not a warrantable condition. Only Dura-Flange® wheels have a 24 month warranty on rim flange wear.

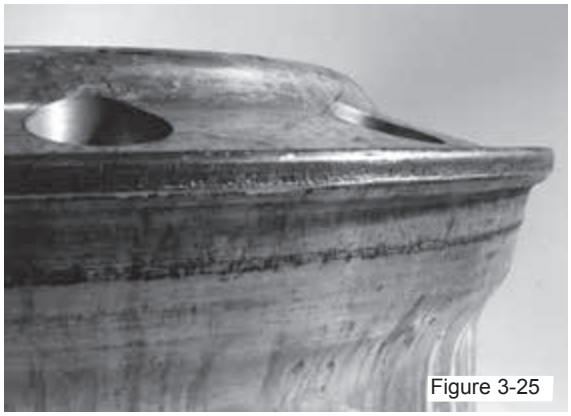


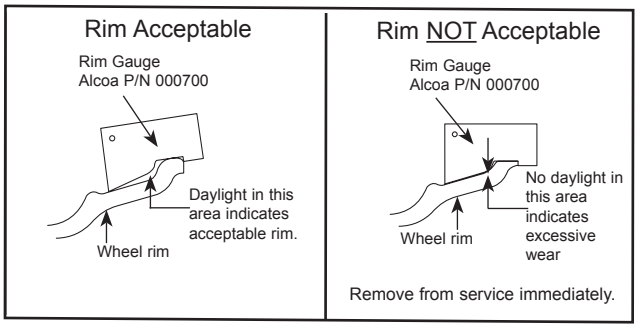
Figure 3-25

Irregular wear on the surface of the rim flange is caused by abrasion from the tire and/or debris. Rim flange wear occurs most often in applications with heavy or shifting loads. If your wheels are experiencing excessive rim flange wear, consider using an Alcoa Dura-Flange® aluminum wheel. These wheels have been specially treated to significantly reduce rim flange wear. Remove wheels from service when rim flange wear is excessive. Excessive wear can be determined using an Alcoa approved wear gauge and the procedures detailed below. If rim flange wear becomes sharp and/or cuts the tire, contact Alcoa for recommended maintenance procedures at (800)242-9898 or at www.alcoawheels.com.

Alcoa Rim Flange Wear Gauge Instructions

THESE GAUGES ARE TO BE USED FOR RIM FLANGE WEAR ONLY. THEY ARE NOT A BEAD SEAT ANGLE OR DIAMETER TOOL.

Chart 3-4



To obtain a gauge(s) (P/N 000700) at no charge and information about free training on installation and maintenance procedures, contact Alcoa Wheel and Transportation Products at (800) 242-9898 or on the web at www.alcoawheels.com.

Rim flange wear (continued)

Determining Rim Flange Wear

STEP 1. Remove the wheel/tire assembly from the vehicle. Remove the valve core per section 2-1 to deflate the tire completely, demount the tire from the wheel according to OSHA regulations, TMC Recommended Practices (RP 209) for tire and rim safety procedures and/or the Alcoa Wheel Service Manual.

STEP 2. After the tire is demounted, verify that circumference of the bead seat on the open side is acceptable (see Section 3-4). Check the wheel flange with the Alcoa Rim Flange Wear Gauge to determine if the wheels must be removed from service for excessive rim flange wear (Figures 3-25 and 3-26).

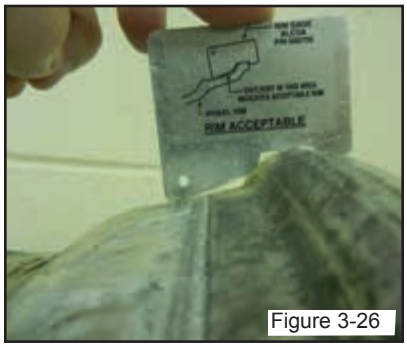


Figure 3-26

SERVICEABLE

Figure 3-27

NOT SERVICEABLE (scrap wheel)

NOTICE: Examine the tire for cuts in the bead area and side wall. If no damage occurred to these areas, return the tire to service. Cut tires should be removed from service. The tire should be inspected at this time for any other damage.

NOTICE: Check the wheel at every tire change for rim flange wear and any sharp edges. Following this practice will significantly reduce the possibility of a rim flange cutting into the tire.

STEP 3. If the wheel is serviceable by the rim flange gauge, examine the wheel flange edge for sharpness by using a rubber sharpness gauge. These gauges are constructed with a section of tire or a suitable piece of rubber attached to a block of wood (Figure 3-27). By running the sharpness indicator gauge along the wheel in the area of the wear, determine if the wear is sharp enough to cut or damage the rubber on the sharpness indicator (Figure 3-28). If the rubber is cut, then follow the edge removal instructions below.

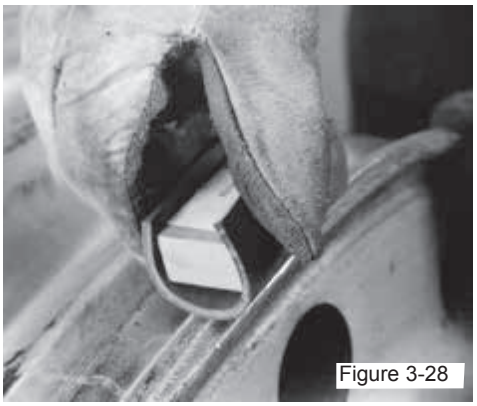


Figure 3-28

A rubber sharpness gauge or a suitable piece of rubber attached to a block of wood.

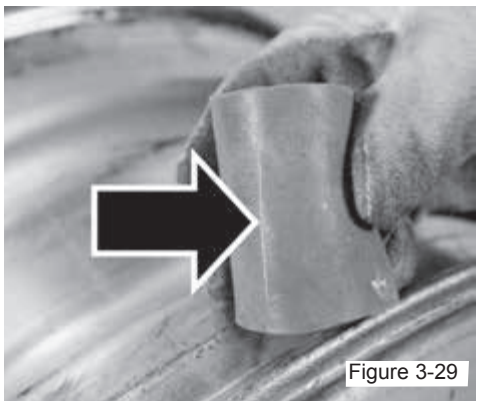


Figure 3-29

Run the sharpness indicator gauge along the wheel in the area of the wear to determine if the wear is sharp enough to cut or damage the rubber on the sharpness indicator.

If the flange cuts or appears close to being sharp enough to cut the rubber on the sharpness indicator gauge, the edge can be removed by following the edge removal procedures on the following page. If the rubber is not cut, then the wheel can be returned to service without further work to the rim flange.

CAUTION

CAUTION Do not run unprotected hands or fingers across worn rim flange areas of used wheels.

Worn rim flange areas are sharp and can cut hands or fingers.

Always wear gloves when handling used wheels or when testing for edge sharpness.

CAUTION

CAUTION Removing sharp edges with hand or power tools produces metal filings and sparks. Many power tools have edges that are sharp or may become hot during use. Some power tools produce excessive noise when used.

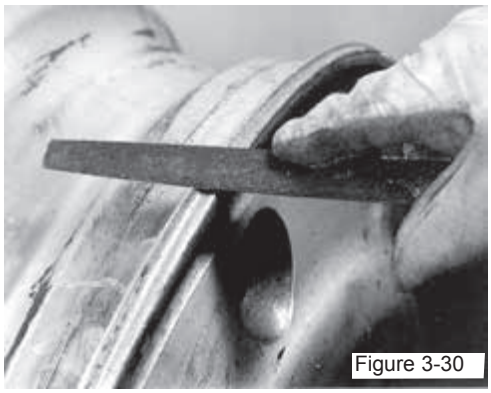
Metal filings can be sharp and, when projected by the action of power tools, can cause serious skin or eye damage. Excessive noise from power tools can harm hearing. Sharp edges can produce cuts and hot surfaces can cause burns.

Always wear appropriate safety gear such as protective eye wear, gloves, protective clothing and hearing protection when using hand or power tools.

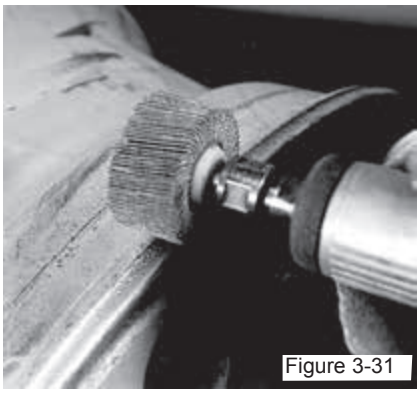
Edge Removal Procedures

There are many tools available to remove the sharp edge on the wheel caused by rim flange wear. Here are some examples of commonly used tools below:

File: A file can be used very effectively to remove the edge (Figure 3-30).



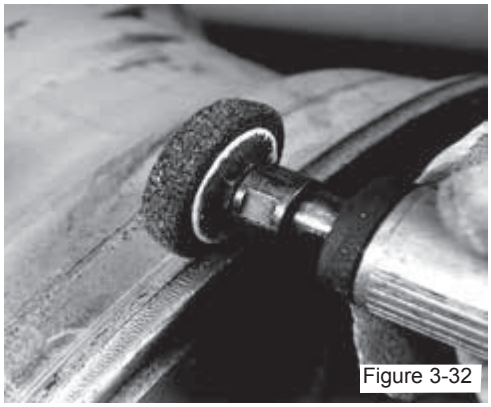
Removing sharp edge by hand with a metal file.



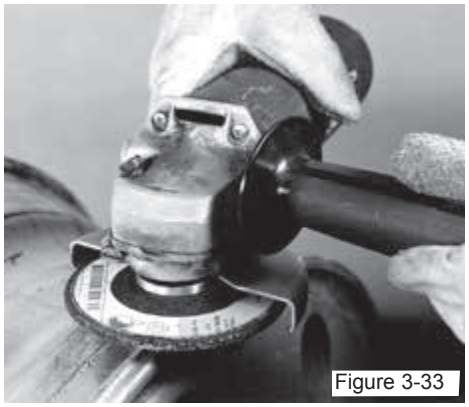
Air or electric power sander.

Air or Electric Powered Sander: This tool provides a very quick and effective method of removing the sharpedge. Technicians should use care to keep a uniform edge when using these tools (Figure 3-31).

Air or Electric Grinder: This tool is another quick and effective method of removing the sharp edge caused by rim flange wear. The grinding pads may “gum up” from the aluminum that is removed (Figure 3-32, 3-33). Care must be used to avoid gouging the wheel.



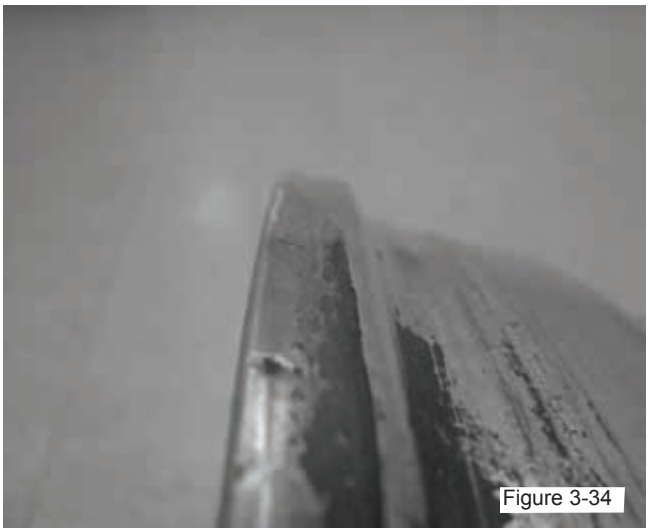
Air or electric power Grinder



Die Grinder.

Die Grinder: Used with a sanding wheel, cutting stone or grinding tool, this is a version of an electric grinder. This tool is very quick and effective as well, but care must be taken to remove metal as uniformly as possible and not to gouge the wheel (Figure 3-33).

Always wear PPE at all times.



Sharp edge removed.

STEP 4. Figure 3-34 shows the result of removing the sharp edge on the rim flange. With whatever tool is selected, work the tool around the wheel's circumference removing only enough material to eliminate the sharp edge. This should only be a small amount of metal. Perform this work on both flanges if there is evidence of sharpness. Take care to make sure the edge removal is as uniform as possible and avoid gouging the wheel.

STEP 5. After the edge is removed, run the sharpness indicator gauge (Figure 3-27) along the flange where the sharp edge was removed to check for any remaining sharpness. If the rubber is still cut, perform the steps again to remove the sharp edge. Always remove the minimum amount of material necessary to eliminate the sharp edge.

STEP 6. Check the rim flange height with the Alcoa Rim Flange Wear gauge to make sure there is adequate height remaining to safely support the tire. Figure 3-25 shows how this gauge is used. Be sure to move the gauge all around the wheel's circumference and make sure that no area of the flange is below what the gauge indicates is acceptable. If the entire wheel flange is within the limits of the rim flange wear gauge, the wheel may be returned to service.

STEP 7. Always inspect the wheel for any other conditions that would warrant removal from service. Consult the Alcoa Wheel Service Manual or the TMC User's Guide to Wheels and Rims for information on Out of Service Conditions.

WARNING

WARNING Welding or brazing the rim flange or any area of an Alcoa aluminum wheel will weaken the wheel. Weakened or damaged wheels can result to an explosive separation of tire from wheels.

WARNING Explosive separations of tires from wheels or wheel failure on the vehicle could cause serious injury or death.

Never attempt to weld or braze any surface of an Alcoa aluminum wheel.

WARNING

WARNING Returning wheels to service with inadequate flange height as determined by the Alcoa Rim Flange Wear Gauge can lead to an explosive separation of tires and wheels.

WARNING Explosive separations of tires and wheels on the vehicle could cause serious injury or death.

Wheels with flange height that falls below the Alcoa gauge have inadequate rim flange height to support the tire on the rim. Immediately and permanently remove any wheel from service that has inadequate rim flange height.

NOTE: Always follow safe mounting procedures and inflation procedures using OSHA approved tire restraining device. See the Alcoa Wheel Service Manual or OSHA safety wall charts and procedures.

Corrosion

3-14

Certain service environments can lead to corrosion. Some of the more common corrosive materials are: salt, magnesium chloride and calcium chloride compounds used for snow removal and highly alkaline materials. If the inflation media to fill the tire is not dry, the areas of the wheel under the tire can corrode severely.

CAUTION

CAUTION The use of liquid tire balancers or sealants in Alcoa wheels may cause extremely rapid corrosion of the wheel rim surface. Alcoa wheels corroded by the use of liquid tire balancers or sealants will not be replaced under the Alcoa limited warranty.

Severely corroded wheels are unsuitable for service.

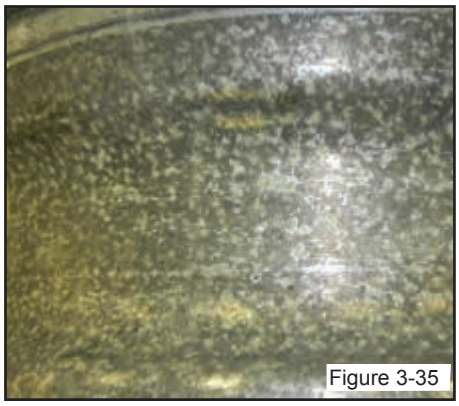


Figure 3-35

Drop Center Corrosion

Bead seat and valve stem corrosion often are caused by trapped moisture. Mild corrosion as shown in Figure 3-35 should be removed until thoroughly cleaned. Remove any severely corroded wheel from service immediately and scrap.

Figure 3-36

Valve Hole Corrosion

The Alcoa Hub Bore Gauge (P/N 000701) is made for wheels used in the transit industry. The corrosion on the hub bore/center hole as shown here are from wheel end systems using a full hub.

Figure 3-37

ACCEPTABLE

Hub Bore Gauge does not fit. This wheel is acceptable for use.

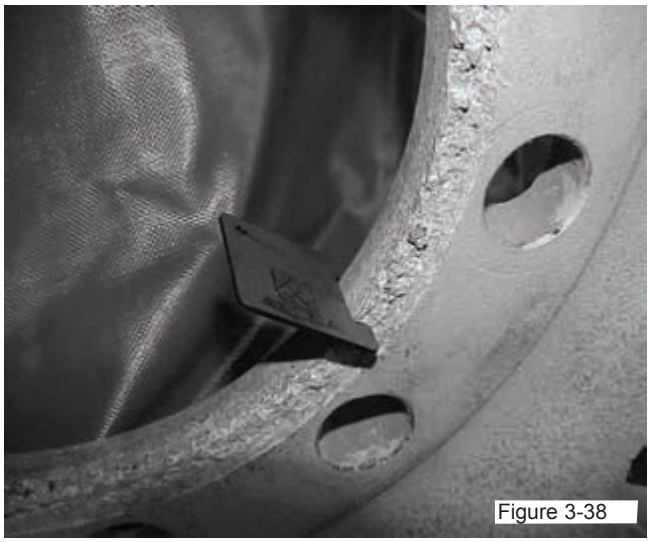


Figure 3-38

UNACCEPTABLE

Hub Bore Gauge fits indicating severe hub bore corrosion. Remove any severely corroded wheel from service immediately and scrap.

Dura-Flange® maintenance

3-15

Dura-Flange® has a **24 month warranty** against wear which creates a sharp edge that requires maintenance per Section 3-13.

Minor wear or minor pitting is not a warrantable condition.

Edge re-conditioning of any kind cannot be performed on Dura-Flange® wheels including those methods as described in Section 3-13.

Figure 3-39

ACCEPTABLE PITTING

Corrosion Prevention (non-Dura-Bright® surface treated wheels)

3-16

The following information is for standard Alcoa forged aluminum wheels without the Dura-Bright® surface treatment. See Section 3-17 for specific instructions on the care and cleaning of Alcoa Dura-Bright® surface treated wheels.

1. Clean frequently with high pressure water. The use of a mild detergent will speed the cleaning process. Do not use harsh alkaline cleaners.

2. When tires are removed the entire wheel must be cleaned and inspected, see Section 3. With a wire brush, remove any foreign materials from the tire side of the rim. Do not use a wire brush to remove dirt and corrosion materials from the appearance surface of the wheel. Generously coat the entire air chamber surface with an approved surface protectant and lubricant each time the tire is removed (see Section 4-1).

3. To maintain the original appearance of Alcoa wheels, the following procedures are recommended:

   a. After installing new wheels and prior to operating the vehicle, use a sponge, cloth or soft fiber brush to wash exposed wheel surfaces with a mild detergent and warm water solution.

   b. Rinse thoroughly with clean water.

   c. Wipe dry to avoid water spots.

   d. Apply polish to the cleaned surface.

   e. Clean Alcoa truck wheels as frequently as required to maintain their appearance.

Dura-Bright® surface treated wheels cleaning and maintenance

Dura-Bright® Wheels are the easy maintenance way to bright, shiny wheels that stay that way when properly maintained. Dura-Bright® wheels clean easily with mild soap and water , and eliminate the need for harsh cleaning products.

Dura-Bright® Wheels are maintained best with an off-the-shelf car wash, or a mild (near neutral) detergent that has a pH between 5-9 or a cleaning solution that has been diluted to a pH between 5-9.

3-17

Do not use strong acid or strong alkaline cleaning products on Dura-Bright® Wheels

Step 1: Before cleaning, allow the wheels to cool down to a temperature below 95˚ F (35˚ C).

Step 2: Rinse wheels thoroughly to remove any loose and visible dirt/debris.

- Rinsing the wheel with water helps to prevent scratching and abrasion.
- Use a water hose or power washer to remove soil, sand, etc.

Step 3: Prepare cleaning solution to a pH 5-9.

- Add a **mild** detergent (e.g. common dish soap liquid) to the water at the specified dilution ratio before applying to vehicle.
- The pH level should be 5-9 in diluted/ready-to-use state.
- If using multiple solutions, each solution must fall within the pH range of 5-9. Do not use strong acid (pH < 5) on Dura-Bright® Wheels.
- Never use cleaning products containing Hydrofluoric acid on Dura-Bright® Wheels.

This is an example of how to test pH.

Step 4: Clean the wheel.

- Apply soap or detergent generously on wheel surface with either a spray applicator, a clean, soft bristled brush or soft sponge.
- Abrasive tools and scouring pads (e.g. 3M Scotch-Brite®) **should not be used.**

Step 5: Rinse the wheel.

- Rinse the wheel thoroughly with clean water to remove all remaining soap and dirt.
- If you intend to dry your wheels, be sure to use a soft cloth free of debris.

If soils attached to the surface do not come off with cold water, try warm water and wipe with a soft towel or chamois cloth. Use warm water and a mild detergent (with assistance of a commercial high pressure power washer, if available). Always dilute the detergent according to the manufacturer's recommendation; never use the detergent straight without diluting with water. Once in service, Dura-Bright® wheels can become nicked or scratched by road debris and/or mechanical damage. If this occurs, continue to follow the normal washing and cleaning instructions provided above.

The mounting area on Dura-Bright® wheels can become scratched, marred or discolored when mounted against another wheel, hub or drum. Components such as high temperature nylon spacers, can prevent scratches. Contact Alcoa Field Service team if you have any questions. • Note: pH value can be found in chemical MSDS (Material Safety Data Sheet) from the product manufacturer. If the cleaner is in concentrated form, contact your cleaning chemical supplier to determine pH levels.

The full Dura-Bright® cleaning procedure can be reviewed in the Dura-Bright® Cleaning Guide available in print and online at www.alcoawheels.com. Only Alcoa's Warranty Center can authorize warranty claims and justify warranty returns. Dura-Bright® and Dura-Flange® claims can only be authorized and determined by Alcoa's Warranty Center.

4 Mounting Alcoa Wheels with Tubeless Tires

Mounting tubeless tires on Alcoa Wheels

4-1

NOTICE: For information on tube type wheels, contact Alcoa at (800) 242-9898 Option 1.

NOTICE: Alcoa Aluminum non-symmetrical wheels require special tire mounting techniques.

WARNING

WARNING Mounting damaged tires or wheels can lead to an explosive separation of tires and wheels.

Explosive separations of tires from wheels can cause serious injury or death.

Inspect tires and wheels for damage before removing from vehicle. If damage is found, the tire must be completely deflated before loosening cap nuts. Immediately and permanently remove damaged tires or wheels from service.

WARNING

WARNING Use of inner tubes in tubeless wheels will hide slow leaks. Slow leaks may indicate cracked or damaged wheels which lead to wheel failures. See Section 3-10.

Wheel failures can cause accidents which may result in serious injury or death.

(Never use an inner tube on an Alcoa tubeless wheel.) Immediately and permanently remove cracked or damaged wheels from service and scrap.

Only properly trained technicians should service tire/wheel assemblies.

Before mounting, be sure that the tire is properly matched to the rim.

1. Do not gouge or nick the wheel. If changing by hand, place aluminum wheels on a clean floor and use a protective mat when mounting tires. Additional care should be used when mounting Alcoa Dura-Bright® surface treated wheels since minor nicks and scratches cannot be polished out (see Section 3-17, page 20 for specific cautions, care and maintenance procedures). If using a tire changing machine, care should be taken to prevent gouging the aluminum wheel.

2. Always use a rubber, leather-faced or plastic mallet.

3. Inspect the tire/wheel for damage. Do not use a damaged or severely corroded wheel (Section 3-14).

4. Clean the wheel disc face and the tire bead seat areas. Be sure the wheel is dry before applying tire lubricant.

5. Identify the short side of the drop center well. Single-piece tubeless rims and wheels must be mounted from the short side of the drop center well. Aluminum wheels typically have symmetrical drop centers so tires can be mounted from either side. however, on certain aluminum wheels, the short side of the drop center well is located on the disc side. See Figure 4-2.

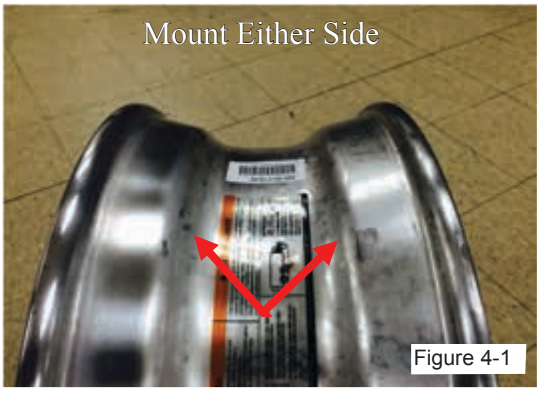


Figure 4-1

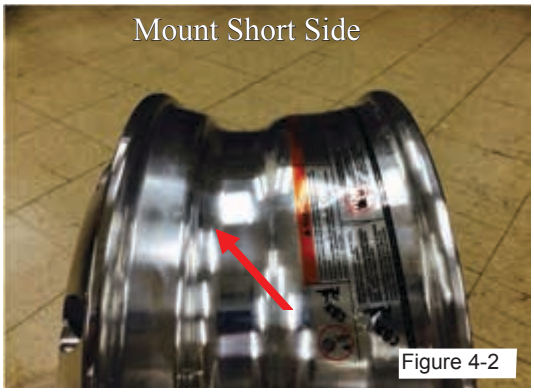


Figure 4-2

Mounting tubeless tires

NOTICE: Not all tire changing machines work alike. Be sure to read the operating or instruction manual for your particular machine before attempting to mount or demount tires.

NOTICE: Do not exceed inflation pressure printed on wheel.

NOTICE: When match mounting tires to Alcoa Aluminum Wheels refer to TMC RP 243.

Figure 4-3

6. Generously lubricate wheel rim flanges, drop well, and tire beads using non-water based lubricant. A non-water based commercial bead lubricant should be used since water can cause corrosion. However, thin vegetable oil soap solutions with a water base are approved.

Tire beads should be mounted over the rim flange closest to the wheel well. Push bead over flange as far as possible.

Never lubricate the rim or tire bead with a flammable solution. This can lead to an explosion during tire inflation.

Figure 4-4

7. Push the tire bead onto the rim as far as possible. Using the curved end of the tire iron (with the stop resting on the rim flange) take small bites to work the remaining section of the bead onto the rim/wheel.

Start the second tire bead into the well, holding it in position with foot or self-locking pliers clamped to the rim of the flange. Insert the curved end of the tire iron with the stop towards the rim and push the iron outwards to work the bead over the flange.

Figure 4-5

8. Take small bites, repeat the operation progressively around the rim. Keep the tire bead in the well with your foot or with self-locking pliers. Continue until the second tire bead is full mounted over the flange.

Inflating Tire/ Wheel Assembly

4-2

WARNING

WARNING Never use a volatile or flammable material, such as ether or gasoline, as an aid to seating the tire beads on the wheel. The use of these materials lead to an uncontrolled pressure build-up in the tire and may result in an explosion with damage to the wheel and cause personal injury.

Explosive separation of the tire from the wheel can occur while seating beads in this manner, while adding pressure to the tire on or off the vehicle, or later on the road. Loss of vehicle control can result, which can cause serious injury or death.

WARNING

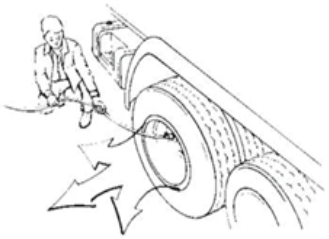
WARNING A pressurized tire/wheel assembly can explode and separate violently.

This violent separation can cause serious injury or death.

WARNING Always contain the tire/wheel assembly in an OSHA compliant restraining device during inflation.

1. Before inflating any tire rim/wheel assembly, be sure to read, understand and comply with ALL WARNINGS. Use only dry air for tire inflation. Be sure that in-line air dryer is maintained properly.

2. After mounting the tire on the rim, if needed use a compressed air tank with a quick release valve to seal the beads. Do not exceed 5 psi before placing the assembly in a OSHA compliant restraining device.



3. Place the assembly in an OSHA compliant restraining device, such as a tire safety cage. Figure 4-6 is an example of one type of a restraining device. Manufacturers recommend that OSHA compliant restraining devices be freestanding and located at least one foot away from any flat or solid surface.

4. Inflate the tire, with the valve core removed, using a clip-on air chuck with an in-line valve or pressure regulator and a sufficent length of hose. Inflate to 20 psi in OSHA compliant restraining device. IMPORTANT! Look for distortions, undulations, or other irregularities in the tire sidewall. Listen for any popping or snapping sounds. See Figure 4-7. The OSHA compliant restraining device should not be bolted to the floor.

If ANY of these conditions are present — STOP! DO NOT approach tire. Before removing from OSHA compliant restraining device, completely deflate tire remotely. Remove clip-on air chuck. Mark tire as damaged for a potential “zipper rupture”. (Render tire immediately unservicable, non-repairable and scrap).

5. Visually inspect tire rim/wheel assemblies throughout the inflation process for improper seating. When inflating a tire, stay out of the trajectory. See “Trajectory” WARNING in OSHA Regulations (Section 6 - Appendix A). DO NOT stand or lean any part of your body against, or reach over, the OSHA compliant restraining device during inflation.

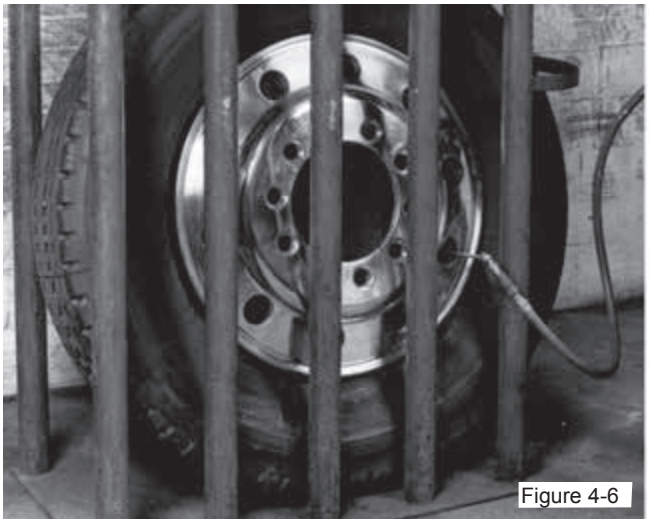


Figure 4-6

Place tire/wheel assembly inside a OSHA compliant restraining device. See Section 6. Refer to tire manufacturer’s recommendation for proper tire pressure. Using a clip-on air chuck or a self-locking straight chuck with remote valve and pressure gauge, inflate the tire/wheel assembly to proper pressure. Be sure to stay out of the trajectory of potential exploding parts or air blasts.

Inflating Tire/ Wheel Assembly (continued)

6. Continue to inflate until the beads are seated on the wheel. Inspect both sides of the tire to be sure that the beads are evenly seated. NEVER inflate beyond 40 psi to seat any tire beads.

If the beads are not seated at 40 psi — STOP! Completely deflate, remove from the restraining device, and demount the tire to determine the problem. Reposition the tire on the rim, relubricate, and reinflate.

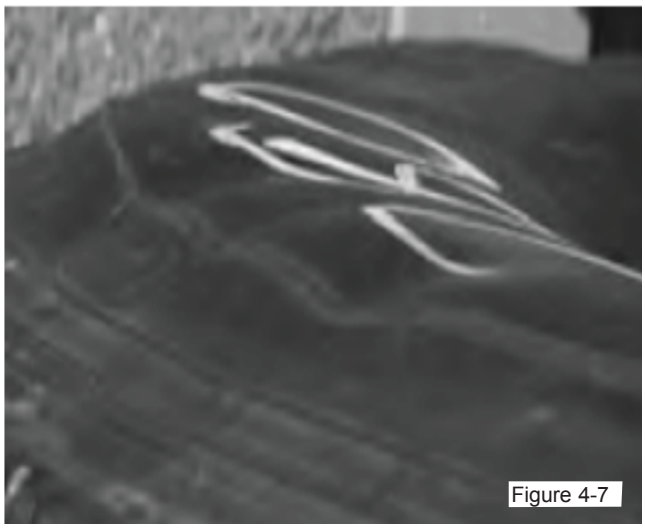


Figure 4-7

7. After the tire beads are seated, continue to inflate the tire to its recommended inflation pressure. IMPORTANT! Look for distortions, undulations, or other irregularities in the tire sidewall, such as in Figure 4-7. Listen for any popping or snapping sounds.

If ANY of these conditions are present — STOP! DO NOT approach tire. Before removing from restraining device, completely deflate tire remotely. Remove clip-on air chuck. Mark tire as damaged and potential “zipper rupture”. Render tire unservicable, non-repairable and scrap.

Refer to RMA or TMC 232.

8. Do not overinflate. Use the tire manufacturer’s recommended pressure, but under no circumstances exceed cold tire pressures roll stamped on the wheel. If none of these “zipper” conditions are present, remove clip-on air chuck, install the valve core, and adjust the inflation pressure to the recommended operating inflation pressure.

9. Before removing the tire wheel assembly from the restraining device, always visually inspect for proper & concentric seating of the beads and all parts.

10. Conduct a final inspection. Heavy duty truck tires have a “guide rib” or "mounting ring" molded into the sidewall next to the tire bead. When the tire is inflated this molded ring should be evenly spaced from the rim flange all the way around the wheel. Check the position of the mounting ring before removing the assembly from the inflation cage. If the ring and wheel are not concentric, deflate the assembly in the cage, re-lube and remount the tire. Check for air leaks. Install a suitable valve cap.

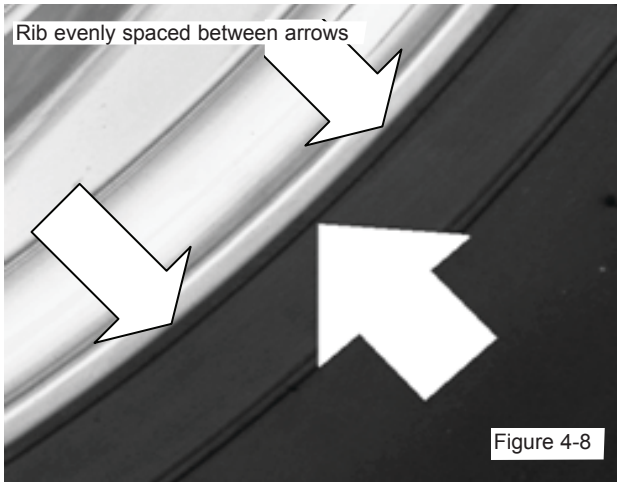


Figure 4-8

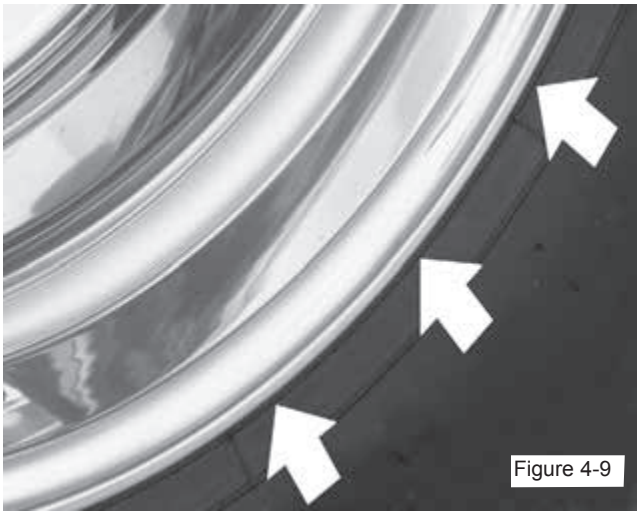


Figure 4-9

Rim Width to Tire Matching

4-3

Rim to tire matching chart for medium and heavy trucks.

Wheel Size	Tire Size (for both radial and bias tires)	Approved Rim Widths
17.5	8R17.5	5.25, 6.00
17.5	9R17.5	6.00, 6.75
17.5	10R17.5	6.75, 7.50
17.5	11R17.5	7.50, 8.25
19.5	8R19.5	5.25, 6.00, 6.75
19.5	225/70R19.5	6.00, 6.75
19.5	245/70R19.6	6.75, 7.50
19.5	265/70R19.7	7.50, 8.25
19.5	445/65R19.5	13.00, 14.00
22.5	8R22.5	5.25, 6.00, 6.75
22.5	9R22.5	6.00, 6.75, 7.50
22.5	235/80R22.5	6.75, 7.50
22.5	245/75R22.5	6.75, 7.50
22.5	10R22.5	6.75, 7.50, 8.25
22.5	255/70R22.5	7.50, 8.25
22.5	255/80R22.5	7.50, 8.25
22.5	275/80R22.5	7.50, 8.25
22.5	11R22.5	7.50, 8.25
22.5	265/75R22.5	7.50, 8.25
22.5	12R22.5	8.25, 9.00
22.5	295/60R22.5	8.25, 9.00
22.5	295/75R22.5	8.25, 9.00
22.5	305/75R22.5	8.25, 9.00
22.5	305/85R22.5	8.25, 9.00
22.5	315/80R22.5	9.00, 9.75
22.5	335/65R22.5	9.00, 9.75, 10.5
22.5	15R22.5	11.75, 12.25
22.5	385/65R22.5	11.75, 12.25
22.5	425/65R22.5	11.75, 12.25, 13.00
22.5	16.5R22.5	12.25, 13.00
22.5	18R22.5	13.00, 14.00
22.5	445/50R22.5	14.00
22.5	445/55R22.5	14.00
22.5	445/65R22.5	13.00, 14.00
24.5	11R24.5	7.50, 8.25
24.5	275/80R24.5	7.50, 8.25
24.5	285/75R24.5	8.25
24.5	12R24.5	8.25, 9.00

Chart 4-1

Reference only. Refer to tire manufacture documentation for tire fitment information

* Source: 2015 TRA Yearbook and ETRTO

Balance weights

4-4

Alcoa wheels are fully machined and do not require balancing. However, the tire/wheel combination may need to be balanced. Internal balancing compounds are not recommended. Use of coated balancing weights is recommended to avoid staining and corrosion of wheel surface.

Always follow the recommended procedures of the balancing weight manufacturer. It may be necessary to reduce the tire pressure when installing clip-on weights to allow clearance of the weight clamp between the tire and rim flange.

Adhesive weights should only be applied to a clean surface on the brake side of the rim flange. Balance weights should be installed in a location where they will not contact the brake components during vehicle operation. Proper pre-cleaning is an essential factor for adhesive balance weights. It is recommended to review the surface cleaning techniques & products with the manufacturer or supplier of balancing weights. Relocating wheels from a cold place to a warmer place may cause condensation on wheel surfaces which can negatively affect the adhesion.

Improperly installed weights could 'come off' during use and damage the vehicle and/or surrounding objects and cause personal injury.

Excessive rim flange wear (see Alcoa Wheel Service Manual Section 3-13 could dictate the use of 'stick-on' or adhesive balancing weights if there is inadequate rim flange to properly hold a clip on (knock on) style weight.

4

Powder, Granulate, Liquid Balancers or Liquid Sealants

Balancing with powder, granulates or liquids is not recommended, nor is sealing tire punctures with liquid sealants. Powder, granulates or liquid balancers as well as liquid sealants may harm tubeless tires. Consult the tire manufacturer's recommendation for information about tire compatibility.

Alcoa Wheel Products Policies do not endorse any specific brand or type of balancing powder or granulates. The use of these balancers in Alcoa wheels may clog valves. A filtered valve core is recommended when using balancing powder or granules. The use of these materials will not void the limited warranty, (see Section 3-11 of the Alcoa Wheel Service Manual), unless inspection of the wheel shows anomalies related to its use.

Caution: The use of liquid tire balancers or sealants in Alcoa wheels may cause galvanic corrosion at the valve hole area as well as corrosion to the valve itself and/or may cause extremely rapid corrosion of the wheel rim surface. Corrosion at the bead seat areas can allow loss of inflation pressure. Corrosion at the valve hole will also result in a loss of inflation pressure.

Severely corroded wheels are unsuitable and should be permanently removed from service and scrap.

Alcoa wheels corroded by the use of liquid tire balancers or sealants will not be replaced under the Alcoa limited warranty.

CAUTION Clip-on balance weights are not recommended for Dura-Flange® wheels.

The usage of clip-on style balance weights will not adequately engage the hardened Dura-Flange® coating. Alcoa recommends adhesive style balance weights for this application.

CAUTION The use of liquid tire balancers or sealants in Alcoa wheels may cause extremely rapid corrosion of the wheel/rim surface. Alcoa wheels corroded by the use of liquid tire balancers of sealants will not be replaced under the Alcoa limited warranty.

Severly corroded wheels are unsuitable for service.

5 Wheel Installation

Recommendations for proper installation of wheels

5-1

1. Make sure all wheel nuts are properly torqued. Dirt/rust steaks radiating from the bolt/stud holes can indicate loose wheel nuts. (See Section 3) If the wheel becomes loose the wheels bolt/stud holes can become elongated (egg-shaped) or damaged as shown in Section 3-8. If wheel nuts are loose you may break studs and/or develop cracks at the wheel bolt/stud holes. This condition may cause the wheel to loosen and disengage from the vehicle.

2. On ball-seat wheels be sure the end of the socket is smooth or cover the wheel mounting surface with a protective shield prior to tightening the cap nuts. The end of the socket will mar the wheel around the cap nuts if it is not smooth.

3. Keep all component contact surfaces smooth and clean. Dirt or projections on mounting surfaces may lead to loose wheels. Remove all projections resulting from burrs, nicks, etc. Be sure that loose dirt does not fall onto mounting surface during assembly.

4. Do not introduce any foreign objects such as spacers or top hats into the contact surface areas of the mounting system unless approved by Alcoa. Do not paint Alcoa forged aluminum wheels.

5. Additional care should be used when mounting Alcoa Dura-Bright® surface treated wheels since minor nicks and scratches cannot be polished out (Section 3-17, for specific cautions, care and maintenance procedures).

6. High temperature nylon spacers are a protection gasket designed to be placed between the wheels and also the brake drum/wheel contact surfaces. High temperature nylon spacers can be used when the tire/wheel assemblies are removed and reinstalled.

WARNING Wheels that are not properly installed or maintained may not be safe.

Failure to follow proper wheel installation or maintenance practices may result in serious injury or death.

Follow the proper wheel installation and maintenance practices as contained in this Alcoa Wheel Service Manual. For training on proper installation and maintenance, available free of charge from Alcoa, or for the most recent updates, contact Alcoa Wheel and Transportation Products at 1-800-242-9898 or on the web at www.alcoawheels.com.

NOTICE: Do not exceed maximum wheel load. Customer must compare OEM vehicle load rating to maximum wheel load rating.

Refer to tire manufacturer's recommendation for proper tire pressure. Before mounting the tire perform a wheel fitment check to insure proper clearance from any obstructions.

NOTICE: Check for and replace bent, broken, cracked or damaged studs. When replacing broken studs, always replace the studs on each side of the broken stud. If two or more studs are broken, replace all the studs for that wheel position. Check with the stud manufacturer for regular maintenance and stud replacement practices.

All wheel fastener hardware should be grade 8 or metric conversion 10.9. Follow the hardware manufacturer's recommendations when replacing studs.

Wheel Nuts

5-2

NOTICE: One-piece flange nuts are not approved for use on any Alcoa wheel application.

WARNING

WARNING Use of chrome-plated wheel nuts which have chrome plating on the surfaces that contact the wheel can cause reduced and inconsistent wheel clamping.

This condition can cause wheels to loosen and disengage from the vehicle, causing serious injury or death.

Never use wheel nuts with chrome-plated contact surfaces. Use only recommended hardware on Alcoa aluminum wheels.

There are many types of nuts and studs in use, and their design and specifications are not standardized. The “R” and “L” on cap nut part numbers indicate right and left-hand threads respectively. Alcoa recommends the following wheel nuts for use with Alcoa aluminum truck wheels:

Flange Nuts

2-piece, 26.25 mm height, 33mm hex head flange nut. Mounts single and dual wheels to wheel centering hubs. Right hand threads used on both sides of vehicle. P/N 39874 (supersedes P/Ns 39701 and 39691); M22-1.5 RH threads.

2-piece, 78.5 mm height, 33mm hex head flange nut. Mounts dual wheels with 32mm bolt holes to wheel centering hubs. Right hand threads used on both sides of vehicle. P/N 430732; M22x1.5 RH threads.
*Available in Dacromet corrosion resistant coating, P/N 578732.

2-piece, 50mm height 33mm hex head flange nut. Mounts single wheels to wheel centering hubs with 32mm bolt holes. Right hand threads used on both sides of vehicle. P/N 430632; M22x1.5 RH threads.
*Available in Dacromet corrosion resistant coating, P/N 578632.

Cap Nuts

1-1/8" X 16 cap nut. Mounts standard single wheels and wide base wheels to 1-1/8" studs. Also mounts outer dual wheel to 1-1/8" inner cap nut. P/N 5996R, 5996L (replaces P/N 5552R, 5552L).

3/4"x16 cap nut. Mounts standard single wheels and wide base wheels to 3/4" studs. Do not use on steel wheels. P/N 5995R, 5995L (replaces P/N 5554R, 5554L).

Inner cap nut, inner thread 3/4"x16, outer thread 1-1/8"x16. For use with steel inner dual wheel and aluminum outer dual wheel with 1.31" (1-5/16) to 1.44" (1-7/16) stud standout. P/N 7896R, 7896L (Grade 8).

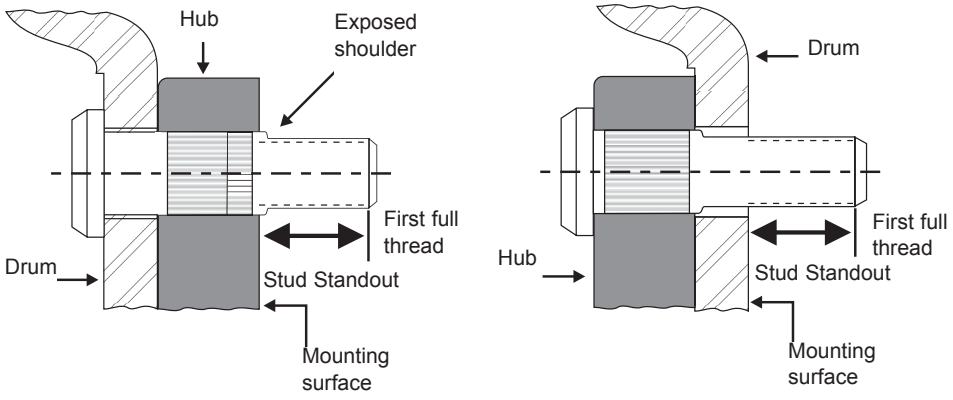
Inner cap nut for use with standard length studs (1.31" [1-5/16] to 1.44" [1-7/16]) stud standout) or longer studs not to exceed 1.88" (1-7/8) stud standout. Full internal and external threads, counter bore 5/16" deep at open end. Prevents stud from bottoming out in cap nut. P/N 5988R, 5988L (Grade 8). For use with studs with exposed shoulders. Do not use with steel inner dual wheel.

FOR MEDIUM DUTY MOUNTING HARDWARE, SEE THE M-SERIES DATA SHEETS ON WWW.ALCOAWHEELS.COM.

How to Measure Stud Standout

5-3

Stud standout is measured from the axle end mounting surface (the hub, for inboard mounted drums, and the drum, for outboard mounted drums) to the first complete thread at the outside end of the stud.



Hub Piloted Mounting System

Single, Dual and Wide Base Wheels, Mounting Two-Piece Flange Nuts

5-4

NOTICE: Do not exceed maximum wheel load. Customer must compare OEM vehicle load rating to maximum wheel load rating.

Refer to tire manufacturer's recommendation for proper tire pressure. Before mounting the tire perform a wheel fitment check to insure proper clearance from any obstructions.

NOTICE: Check for and replace bent, broken, cracked or damaged studs. When replacing broken studs, always replace the studs on each side of the broken stud. If two or more studs are broken, replace all the studs for that wheel position. Check with the stud manufacturer for regular maintenance and stud replacement practices.

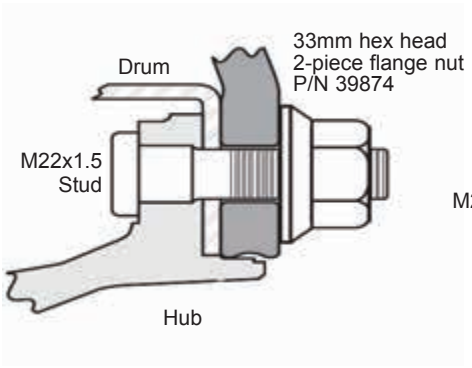
All wheel fastener hardware should be grade 8 or metric conversion 10.9. Follow the hardware manufacturer's recommendations when replacing studs.

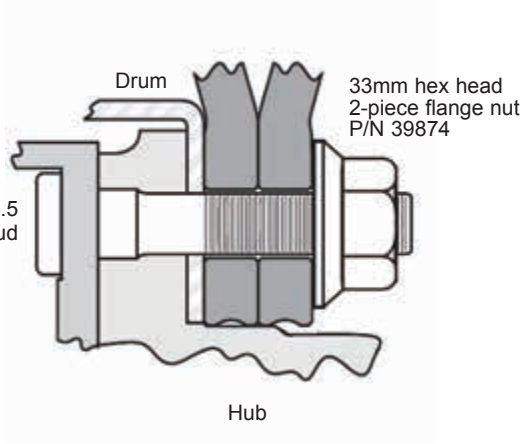
Most U.S. manufacturers of highway trucks, tractors and trailers equipped with the hub piloted wheel mounting system requires wheel studs and flange nuts with metric threads. Most frequently these are M22x1.5.

Most states/provinces have laws which dictate full thread engagement or thread engagement past the nut body. Make sure you know the laws for the states/provinces in which you operate and comply with them.

Note: Some stud piloted ball seat wheels have the same number of holes and bolt circle diameter as hub piloted wheels. Never mix hub piloted & stud piloted wheels.

Hubs designed for steel hub piloted wheels may not have enough pilot length to locate dual aluminum wheels. Pay close attention to pilot length, particularly when converting from steel to aluminum duals. Measure the hub pilot tab length to make sure the hub properly centers the wheels. The pilot tab length for sufficient centering must be 5 mm (0.20") or more for mounting single wheel and 1x disc thickness + 5mm (0.20") for mounting dual wheels.





When mounting painted steel inner dual wheels with outer aluminum wheels, be cautious of excessive paint (3.5 mil) build-up and flaking on the inner steel wheel. Excessive paint can reduce the clamping force and allow the wheels to become loose.

Typical assembly of hub piloted single and dual wheels use 33mm hex head two-piece flanged nuts, Part No. 39874. If hex nuts with greater overall height are used, more stud length is required.

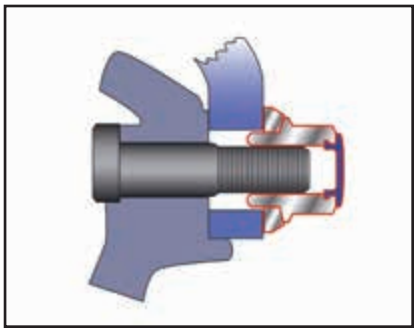
Two-Piece Sleeved Flange Nuts

Sleeved flange nuts serve two purposes:

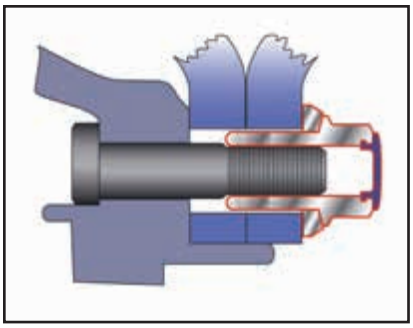
1. May increase thread engagement.
2. Reduce stud hole misalignment.

When using sleeved flange nuts.

- There are two kinds of sleeved flange nuts, single mount and dual mount as shown. One that aligns outer wheels only. One that goes into the inner dual wheel. Either sleeve cap nut is acceptable for Alcoa wheels.
- All threads in the sleeve do not need to be engaged with the wheel bolt for proper installation.
- Always use wheels and hardware that are designed for use with sleeved flange nuts.



Single mounted wheels require sleeved flange nuts with a short sleeve



Dual mounted wheels require sleeved flange nuts with a long sleeve.

Tightening Hub Piloted, Two-Piece Flange Nuts

5-5

Two-piece flange nuts must be properly tightened.

Refer to the chart below for industry standard torque of two-piece flange nuts.

Nut Thread	Torque Level Ft-Lb Lubricated
11/16" - 16	300-400
7/8" - 14	350-400
M20 x 1.5	280-330
M22 x 1.5	450-500

Chart 5-1

Source: TMC. Refer to truck manufacturer guidelines for specific recommendations.

Impact wrenches, if used, should be carefully adjusted to apply torques within the limits recommended. Nuts should be tightened in recommended criss-cross sequences.

WARNING

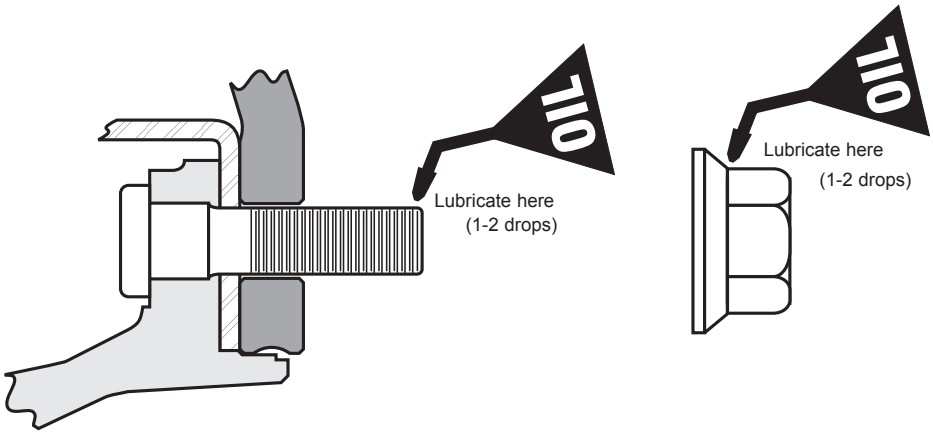
WARNING Undertorqued flange nuts allow wheels to run loose and fatigue studs or lose nuts. Overtorquing can yield studs causing them to fail.

Both under and overtorquing can lead to wheel detachment which can result in serious injury or death.

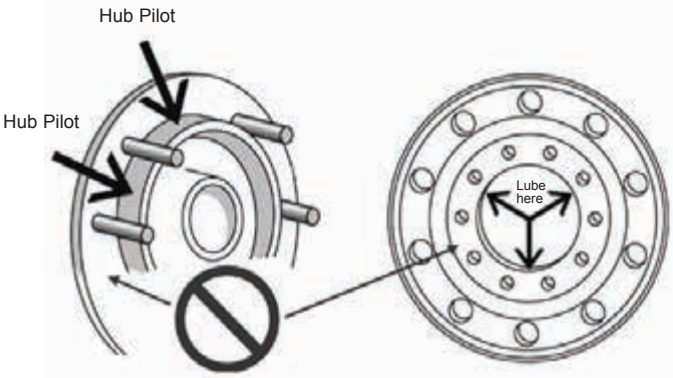
Check all parts including wheels, studs and flange nuts. Check mounting faces of wheels, hubs and drums. Check for dirt, corrosion or damage. Remove dirt and rust; replace damaged parts. Follow correct tightening sequences and torque levels.

Tightening Hub Piloted, Two-Piece Flange Nuts (continued)

Before installing two-piece flange nuts, use 1 to 2 drops of motor oil to lightly lubricate the first two or three threads at the tip of each stud, and the contact surfaces between the flange nut and the washer as illustrated below. This will minimize corrosion between the mating surfaces. Lubrication is not necessary with new hardware.



Prior to mounting hub piloted wheels, coat the wheel hub bore. Then push wheels onto the hub so that excess lube will scrape off and not be pushed between the mounting surfaces with a non-water-based lubricant to minimize corrosion and build-up between the wheel and hub pilot. Excessive corrosion build-up between the wheel and hub pilots can make wheel removal difficult. Do not lubricate the face of the wheel, hub or brake drum.

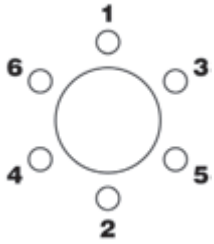


Do NOT get lubricant on the face of the hub, wheel face or brake drum

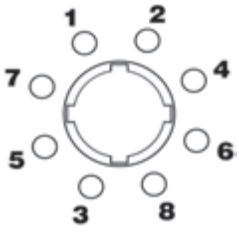
Lubricate the wheel hub bore hole as shown above

Position one of the hub's pilot pads at the twelve o'clock position. After positioning wheels on the pilot pads, hand tighten all two-piece flange nuts, then tighten to the recommended torque following the proper sequence shown below for your type wheel. After a wheel assembly has been installed and torqued, check the fastener torque again within 5 - 100 miles. Individual fleet conditions will influence the mileage interval. Refer to TMC RP 237 - Retorquing Guidelines for Disc Wheels which establishes guidelines for determining the fleet torque check interval.

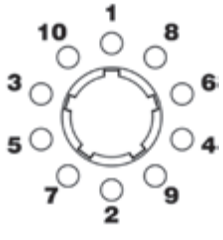
NOTICE: In service, stud dimensions and condition may change over time due to environmental conditions, multiple re-installations, improper torquing and other factors. Consult your hub and stud manufacturer for maintenance and replacement recommendations.



Six Stud



Eight Stud



Ten Stud

Alcoa Mounting Tool (P/N 000426)

5-6

WARNING All wheel mounting tools must be removed before vehicle operation. Wheels that are not properly installed or maintained may not be safe.

WARNING Failure to follow proper wheel installation or maintenance practices may result in injury or death. Alcoa Mounting Tool will not seat brake drums that have bolt holes larger than .980” in diameter.

Follow the proper wheel installation and maintenance practices as contained in the Alcoa Wheel Service Manual. For additional copies of the manual and other useful items, available free of charge, or for the most recent updates, contact Alcoa Wheel Products at 800-242-9898 or on the web at www.alcoawheels.com

The Alcoa Wheel Mounting Tools are designed to:
1) Align wheel bolt holes
2) Seat brake drums that have .980” diameter bolt holes
   (Will not seat brake drums that have bolt holes larger than .980” in diameter)
3) Prevent thread damage to M22x1.5 studs

Assembly Instructions

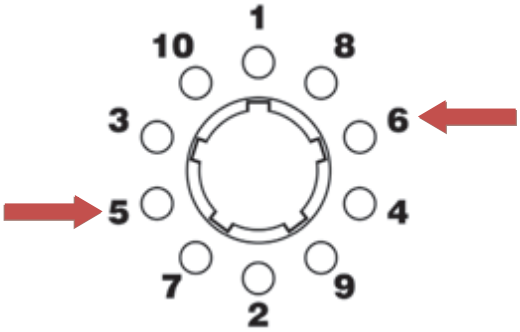
1. After properly installing the brake drum, install (2) wheel mounting tools to seat The brake drum as indicated in figures below. Do not torque the wheel mounting tools in excess of 400 foot pounds.

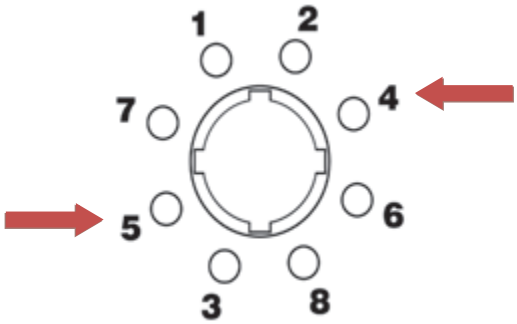
2. Install the wheel on the hub, aligning it with the wheel mounting tools.

3. Install lug nuts according to recommended practice. Section 5-5

4. Once flange nut pressure is sufficient to keep the wheel and drum assembly snug against the hub, remove wheel mounting tools individually as needed to follow installation pattern.

5. After all wheel mounting tools are removed, torque flange nuts to required torque levels. (Section 5-5)





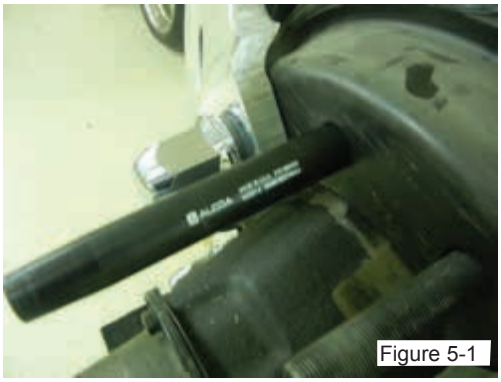


Figure 5-1

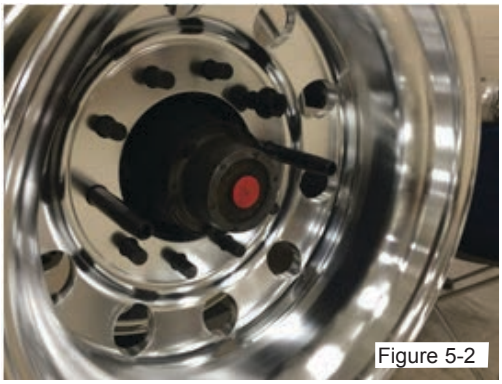


Figure 5-2

Keep Wheel Nuts Tight (Hub Piloted)

5-7

Flange nuts must be kept tight, the torque, studs and nuts should be checked at regular service intervals. Nuts and studs should be inspected at tire changes to ensure they are in serviceable working condition. If nuts require frequent tightening or studs break frequently, hardware and mounting practices should be reviewed.
NOTE:

1. Tightening wheel nuts to their specified torque is extremely important. Undertightening results in loose wheels which can damage wheels, studs and hubs, and can result in wheel loss. Overtightening can damage studs, nuts and wheels and results in loose wheels as well.

2. All torque wrenches, impact wrenches and any other tools used for tightening flange nuts should be calibrated periodically to ensure the proper torque is applied.

3. Refer to OEM for torque ranges of hardware that is not noted in this manual.

Stud Piloted Mounting System

Single and Widebase

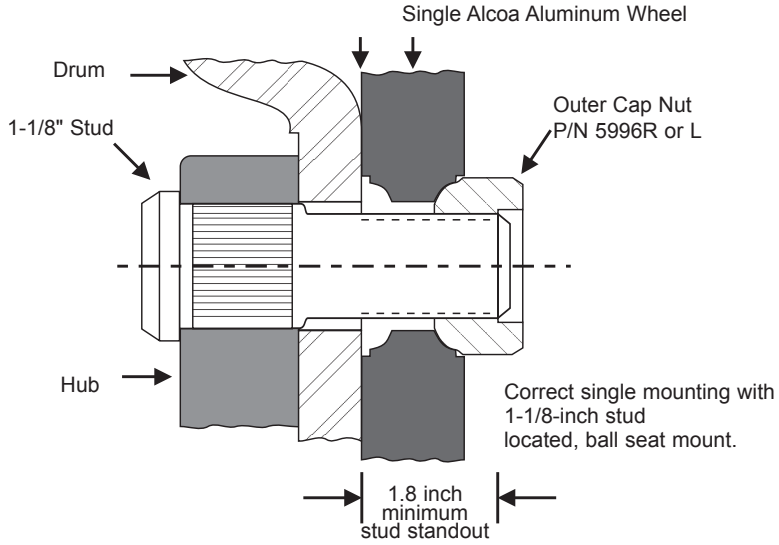
5-8

The cap nut seat for the stud piloted system is a precision-machined spherical surface. Cap nuts must be properly manufactured to assure correct seating. Never use one or two-piece flange nuts on a wheel designed with ball seats (Section 5-11).

Ball seat cap nuts may be obtained from your Alcoa Wheel Distributor.

Front wheels are mounted as singles and require 1.8” (45.7mm) minimum stud standout. Most vehicles have 1-1/8-inch studs on the front hubs. Alcoa single cap nuts, Part Nos. 5996R and 5996L, or equivalents, should be used. Some front hubs have 3/4-inch studs. On these hubs, use Alcoa single cap nuts, Part Nos. 5995R and 5995L or equivalents.

High temperature nylon wheel spacers can be used with Alcoa Dura-Bright® surface treated wheels to protect the wheel contact surfaces from marring. High temperature nylon spacers can be placed between the contact surfaces of the Dura-Bright® wheels and the brake drum.



Stud Piloted Mounting System

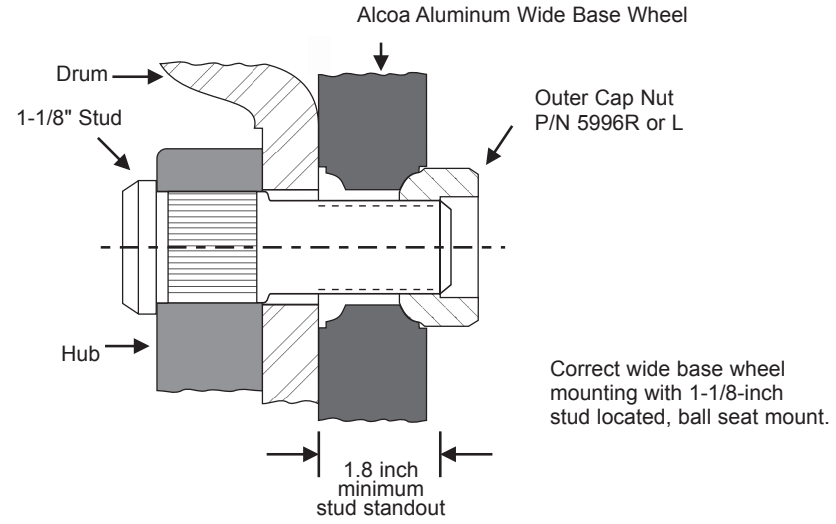
Single and Widebase (continued)

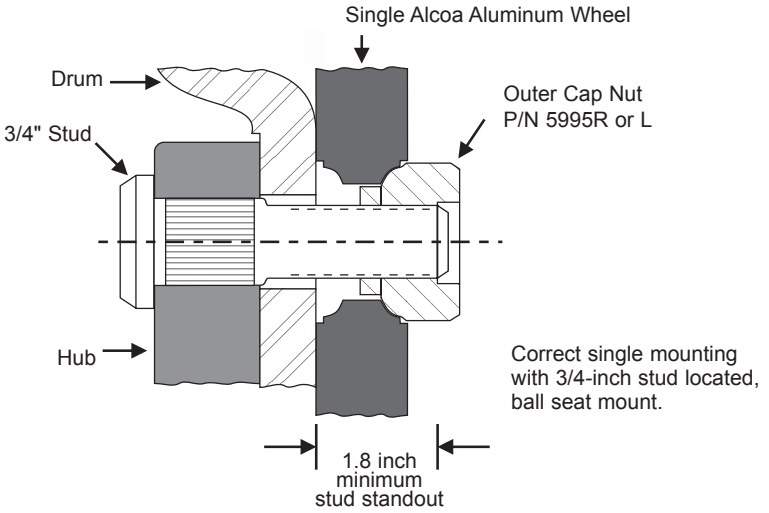
NOTICE: Do not exceed maximum wheel load. Customer must compare OEM vehicle load rating to maximum wheel load rating.

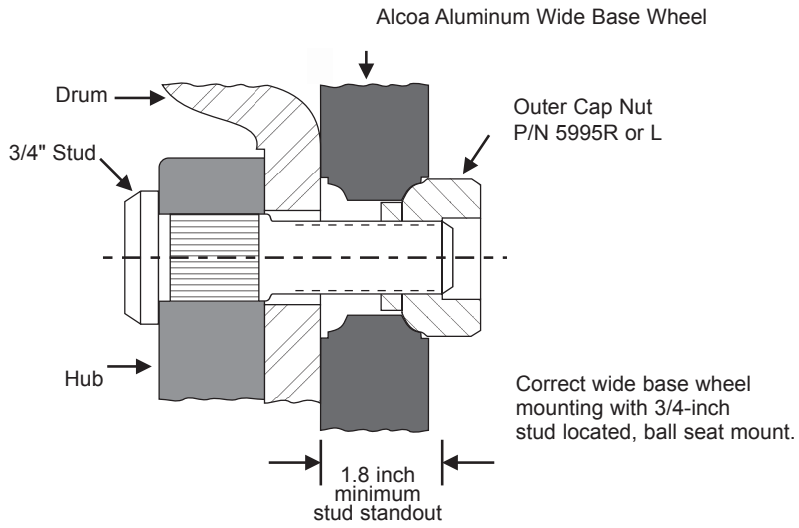
Refer to tire manufacturer's recommendation for proper tire pressure. Before mounting the tire perform a wheel fitment check to insure proper clearance from any obstructions.

NOTICE: Check for and replace bent, broken, cracked or damaged studs. When replacing broken studs, always replace the studs on each side of the broken stud. If two or more studs are broken, replace all the studs for that wheel position. Check with the stud manufacturer for regular maintenance and stud replacement practices.

All wheel fastener hardware should be grade 8 or metric conversion 10.9. Follow the hardware manufacturer's recommendations when replacing studs.


Alcoa Aluminum Wide Base Wheel
Drum
1-1/8" Stud
Outer Cap Nut
P/N 5996R or L
Hub
Correct wide base wheel mounting with 1-1/8-inch stud located, ball seat mount.
1.8 inch minimum stud standout




Alcoa Aluminum Wide Base Wheel
Drum
3/4" Stud
Outer Cap Nut
P/N 5995R or L
Hub
Correct wide base wheel mounting with 3/4-inch stud located, ball seat mount.
1.8 inch minimum stud standout

Stud Piloted Mounting System

Dual Wheels

5-9

NOTICE: Do not exceed maximum wheel load. Customer must compare OEM vehicle load rating to maximum wheel load rating.

Refer to tire manufacturer's recommendation for proper tire pressure. Before mounting the tire perform a wheel fitment check to insure proper clearance from any obstructions.

NOTICE: Check for and replace bent, broken, cracked or damaged studs. When replacing broken studs, always replace the studs on each side of the broken stud. If two or more studs are broken, replace all the studs for that wheel position. Check with the stud manufacturer for regular maintenance and stud replacement practices.

All wheel fastener hardware should be grade 8 or metric conversion 10.9. Follow the hardware manufacturer's recommendations when replacing studs.

Rear wheels are most frequently mounted as duals. Each inner aluminum wheel is attached by 10 inner cap nuts. Alcoa recommends use of inner cap nuts 5978R, 5978L, or 5988R, 5988L.

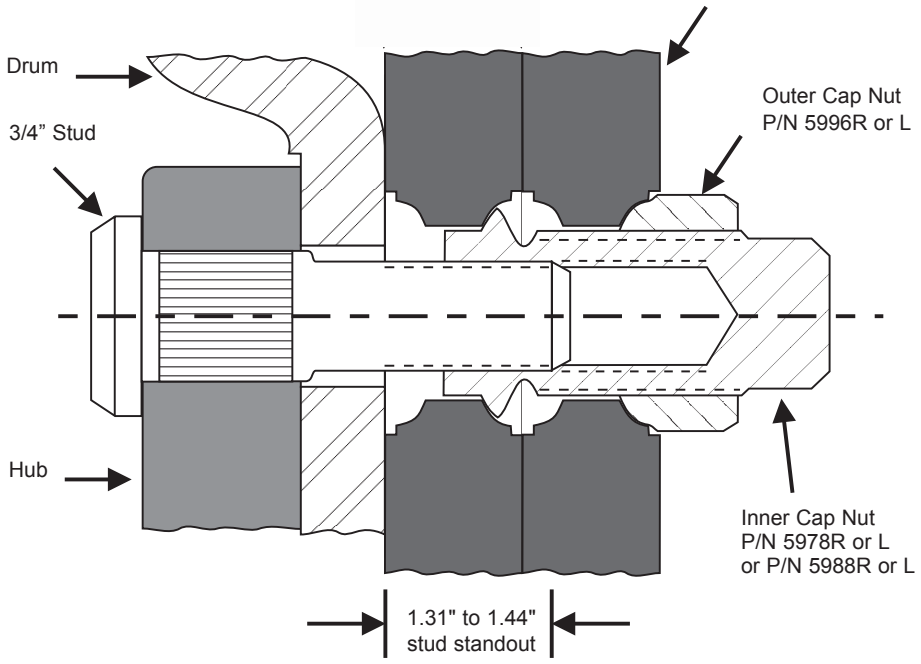
Cap nuts recommended by Alcoa are compatible with Alcoa wheels. Hardware of equal dimensions and strength may be used.

Most vehicles have standard length studs (1.31" [1-5/16"] to 1.44" [1-7/16"] stud standout). Some vehicles use studs longer than standard (up to 1.88" [1-7/8"] standout).

When changing types of brake drums be sure to check for excessive stud standout (greater than 1.88" [1-7/8"]). Most states and provinces have their own standards for fastener engagement. Most of these consist of at least 1 to 2 threads past full thread engagement. Excessive stud standout may cause the inner cap nut to bottom out on the longer stud preventing proper seating of the wheel.

Each outer dual wheel is attached by 10 single cap nuts which thread on the inner cap nuts. Use Alcoa outer cap nuts, Part Nos. 5996R, 5996L or equivalents. Dual wheels should be put on the vehicles with the valve stems 180° apart in order to access the inner wheel valve stem.

Alcoa Aluminum Wheels



Correct mounting for dual aluminum, stud piloted / ball seat mount wheels.

Stud Piloted Mounting System

Steel Inner/ Aluminum Outer Dual Wheels

5-10

WARNING

WARNING Incorrect inner cap nuts used with dual aluminum wheels can bottom out on the unthreaded portion of the stud before the wheels are properly seated.

Improperly seated wheels can run loose, cause stud breakage and detach from the vehicle which can cause serious injury or death. Loose running wheels can lead to stud breakage.

Use only cap nut 5978R or L, 5988R or L, or their equivalent when mounting dual aluminum wheels.

On occasion Alcoa aluminum truck wheels are dualed with a steel inner wheel. When this application occurs it is recommended that a high temperature nylon spacer to be used, because of corrosion issues. In the event a steel inner wheel is used, extreme care must be exercised to properly seat it to the hub or drum before mounting the outer aluminum wheel. Selection of an inner cap nut capable of fixing the steel inner wheel and providing adequate external thread length to secure the outer aluminum dual wheel is critical to a safe assembly. Alcoa recommends the use of inner cap nuts 7896R and L (Grade 8), or equivalent, for this purpose.

Stud Piloted Mounting System

Steel Inner/ Aluminum Outer Dual Wheels (continued)

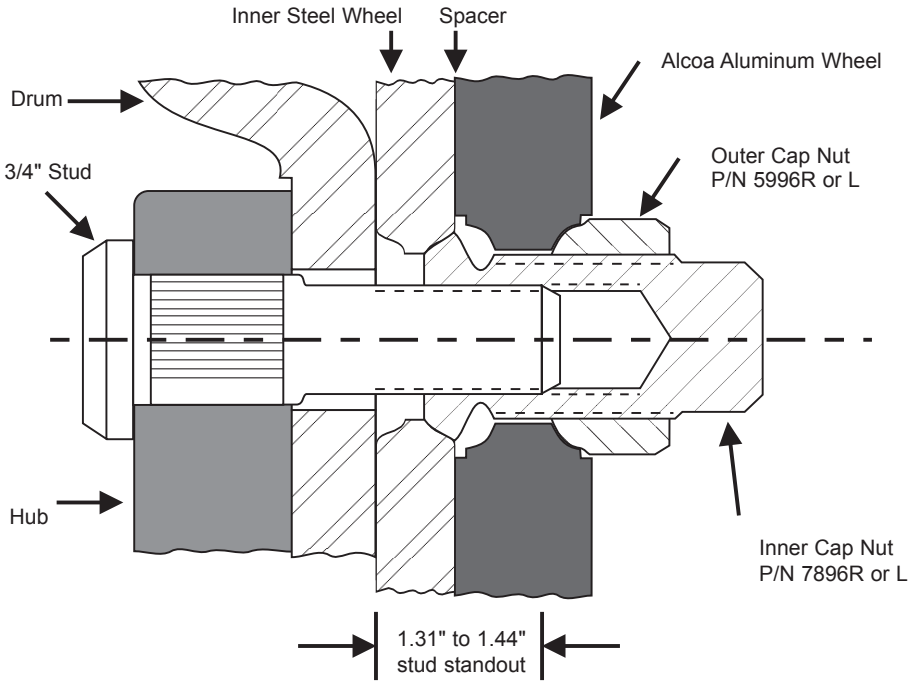
5-10

NOTICE: Do not exceed maximum wheel load. Customer must compare OEM vehicle load rating to maximum wheel load rating.

Refer to tire manufacturer's recommendation for proper tire pressure. Before mounting the tire perform a wheel fitment check to insure proper clearance from any obstructions.

NOTICE: Check for and replace bent, broken, cracked or damaged studs. When replacing broken studs, always replace the studs on each side of the broken stud. If two or more studs are broken, replace all the studs for that wheel position. Check with the stud manufacturer for regular maintenance and stud replacement practices.

All wheel fastener hardware should be grade 8 or metric conversion 10.9. Follow the hardware manufacturer's recommendations when replacing studs.



Correct dual mounting for steel inner/aluminum outer stud piloted ball seat mount.

WARNING

WARNING Incorrect inner cap nuts used with steel wheels can bottom out on the unthreaded portion of the stud before the wheels are properly seated.

Improperly seated wheels can run loose, cause stud breakage and detach from the vehicle which can lead to serious injury or death. Loose running wheels can lead to stud breakage.

Use only cap nut 7896R or L or its equivalent when mounting steel inner duals.

WARNING

WARNING Inadequate wheel support surface can lead to stud hole-to-stud hole fracture resulting in separation of the outer disc and rim from the vehicle.

Separation of the wheel from the vehicle can cause serious injury or death.

Alcoa aluminum wheels with 11-1/4" diameter bolt circle require a support surface at least 13-3/16" in diameter. Check the outer support surface of the inner steel wheel for flatness and adequate diameter before installing the outer wheel. When the wheels are serviced, check the mounting surfaces of both wheels for stud hole-to-stud hole cracks. If cracks are found, immediately and permanently remove the wheel from service and scrap. For the support surface diameter required by other bolt circle sizes, ask your Alcoa representative.

WARNING

WARNING Use of two-piece flange nuts on stud piloted wheels or ball seat cap nuts on hub piloted wheels is dangerous.

Using the wrong cap nuts can cause loss of torque, broken studs, and cracked wheels, wheel loss which can lead to serious injury or death.

Use only hardware designed specifically for each wheel type. See Section 5-2 for proper hardware assemblies.

Tightening Stud Piloted, Ball Seat Cap Nuts

5-11

Wheel cap nuts must be properly tightened.

Refer to the chart below for the proper nut torque of stud piloted, double cap nuts:

Ball Seat Radius	Nut Thread	Torque Level Ft-Lb Dry
7/8"	3/4"- 16	450-500
7/8"	1/18" - 16	450-500
1 - 3/16"	15/16" - 12	750-900
1 - 3/16"	1/18" - 16	750-900
1 - 3/16"	1-5/16" - 12	750-900

Chart 5-2

Source: TMC. Refer to truck manufacturer guidelines for specific recommendations.

WARNING

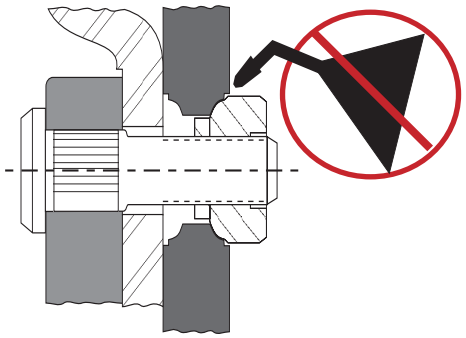
WARNING Undertorqued cap nuts allow wheels to run loose, pounding out (deforming) the ball seats, fatiguing studs or losing nuts. Overtorquing can stretch studs causing them to fail.

Both under and overtorquing can lead to wheels coming off, causing serious injury or death.

Check all parts, including wheels, studs and cap nuts. Check mounting faces of wheels, hubs and drums. Check for dirt, corrosion or damage. Remove dirt and rust; replace damaged parts. Follow correct tightening sequences and torque levels.

Note:

Never get lubricant on the wheel or nut ball seat or mounting faces.



WARNING

WARNING Lubricants should not be applied to the cap nut seat or to the cap nut-to-wheel contact surface.

Oiled seats can lead to over-torquing which can yield studs causing failure. Failed studs can cause the wheel to detach from the vehicle, causing serious injury or death.

Lubricants must be completely removed from the cap nut seats and contact surfaces if applied accidentally.

On vehicles equipped with the stud piloted, ball seat, mounting systems, wheel studs on the right side of the vehicle have right-hand threads and those on the left have left-hand threads. The “R” and “L” on the studs and nuts indicate right and left-hand threads respectively.

Tightening Stud Piloted, Ball Seat Cap Nuts (continued)

Figure 5-3

INNER CAP NUT. This should be used for dual wheel.

NOTE :There are two different inner cap nuts for aluminum and steel wheels. The inner cap nut in Figure 5-3 is for use with dual aluminum wheels.

Note:

The top of the inner cap nut will have thread direction identified on the end of the nut.

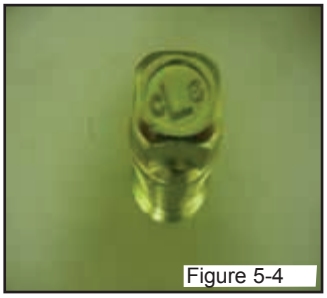


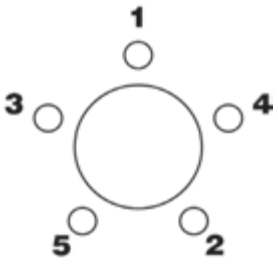
Figure 5-4

INNER CAP NUT LEFT HAND THREADS. The letter L should appear on the end of the cap nut.

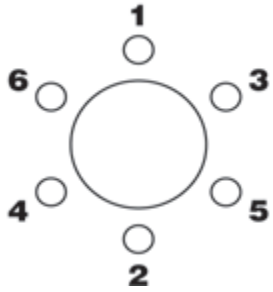
Figure 5-5

INNER CAP NUT RIGHT HAND THREADS. The letter R should appear on the end of the cap nut.

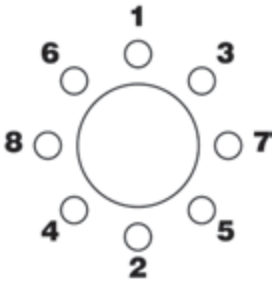
After mounting a wheel over the studs, snug up the cap nuts in the order shown in the illustrations that follow. After all the cap nuts have been snugged, tighten the cap nuts to the recommended torques, following the same tightening sequence.



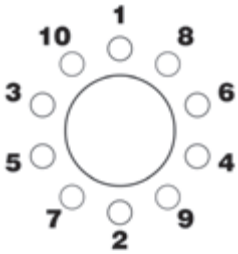
Five Stud



Six Stud



Eight Stud



Ten Stud

NOTICE: In service, stud dimensions and condition may change over time due to environmental conditions, multiple re-installations, improper torquing and other factors. Consult your hub and stud manufacturer for maintenance and replacement recommendations.

Tightening Stud Piloted, Ball Seat Cap Nuts (continued)

After a wheel assembly has been installed and torqued, check the fastener torque again within 5 - 100 miles of operation and retighten the nuts if necessary the recommended torque using the proper sequence. Individual fleet conditions will influence the mileage interval. Refer to TMC RP 237 - Retorquing Guidelines for Disc Wheels which establishes guidelines for determining the fleet torque check interval. To check and retorque an inner nut, it is necessary to loosened the outer nut first, and then tighten the inner nut. Finally, the outer nuts must be retightened to the proper level.

Keep Stud Piloted Wheel Nuts Tight

5-12

Cap nuts must be kept tight, and studs and nuts should be checked frequently. Nuts should be properly retorqued if necessary. At tire changes, nuts and studs should be inspected for cracks and stripped or damaged threads. After each wheel mounting, cap nut torque should be checked with a properly calibrated torque wrench.

Impact wrenches, if used, should be carefully adjusted to apply torque within the limits recommended. Torquing of cap nuts should be tightened in recommended sequences.

Some states/provinces have laws which dictate full thread engagement or thread engagement past the nut body. Make sure you know the laws for the states/provinces in which you operate and comply with them.

When checking the cap nuts on dual disc wheels utilizing the stud piloted ball seat mounting system, loosen every other other cap nut and then check the torque of the inner cap nuts. Retorque the loosened outer cap nuts. Repeat procedure with the rest of the nuts. Check all cap nuts for the proper torque after the first use or any removal. Inspect wheels (see Section 3) and check wheel nuts during service stops. Dirt and rust streaks from cap nuts may indicate looseness.

NOTE:

1. If using specialty fasteners (cap nuts) or any hardware not noted above, consult the manufacturer for recommended torque values.

2. Tightening wheel nuts to their specified torque is extremely important. Undertightening results in loose wheels which can damage wheels, studs and hubs, and can result in wheel loss. Overtightening can damage studs, nuts and wheels and result in wheel loss as well.

5-13

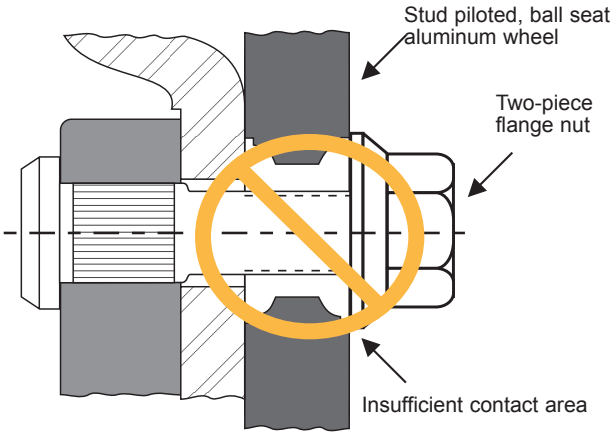
WARNING

WARNING Use of two-piece flange nuts on ball seat wheels, ball seat cap nuts on hub piloted wheels or single-piece flange nuts in place of 2-piece flange nuts is dangerous.

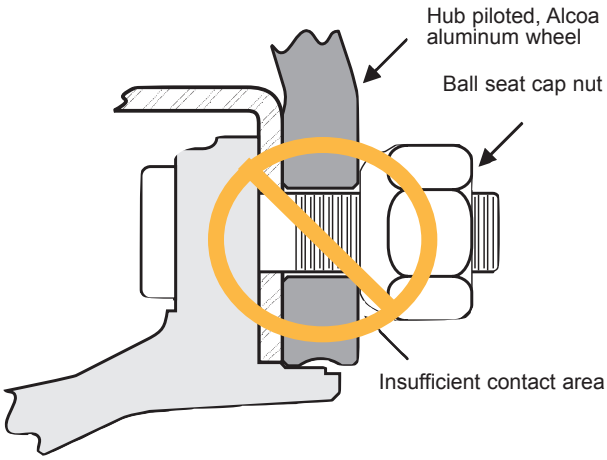
Using the wrong wheel nuts can cause loss of torque, broken studs and cracked wheels, conditions which can lead to serious injury or death.

Use only hardware designed specifically for each wheel type. See Section 5-2 for proper hardware assemblies.

The following are examples of incorrect wheel assemblies.



Incorrect use of stud piloted wheels on hub piloted system. Do not use ball seat wheels as inner and outer duals with a hub piloted wheel system.



Incorrect use of a ball seat cap nut on a hub piloted system. Do not use ball seat cap nuts with hub piloted wheels.

Incorrect use of stud piloted wheel on hub piloted system. Do not use ball seat wheels as outer duals with a hub piloted mounting system.

NOTE:

Notice all the different variations of mounting wheels incorrectly on hubs.

Incorrect use of a hub-piloted wheel as an inner. Do not use hub-piloted wheels with stud-piloted mounting systems. Note lack of contact between duals on a stud piloted system.

Incorrect use of ball seat wheel on hub piloted system. Do not use ball seat wheels as inner duals with a hub piloted wheel system.

6 OSHA Regulations

OSHA Regulations

(29 C.F.R. Section 1910.177)

(a) Scope.

(1) This section applies to the servicing of multi-piece and single piece rim wheels used on large vehicles such as trucks, tractors, trailers, buses and off-road machines. It does not apply to the servicing of rim wheels used on automobiles, or on pickup trucks and vans utilizing automobile tires or truck tires designated "LT".

(2) This section does not apply to employers and places of employment regulated under the Longshoring Standards, 29 CFR part 1918; Construction Safety Standards, 29 CFR part 1926; or Agriculture Standards, 29 CFR part 1928.

(3) All provisions of this section apply to the servicing of both single piece rim wheels and multi-piece rim wheels unless designated otherwise.

(b) Definitions.

Barrier means a fence, wall or other structure or object placed between a single piece rim wheel and an employee during tire inflation, to contain the rim wheel components in the event of the sudden release of the contained air of the single piece rim wheel.

Charts means the U. S. Department of Labor, Occupational Safety and Health Administration publications entitled "Demounting and Mounting Procedures for Truck/Bus Tires" and "Multi-Piece Rim Wheel Matching Chart," the National Highway Traffic Safety Administration (NHTSA) publications entitled "Demounting and Mounting Procedures for Truck/Bus Tires" and "Multi-Piece Rim Wheel Matching Chart," or any other poster which contains at least the same instructions, safety precautions and other information contained in the charts that is applicable to the types of wheels being serviced.

Installing a rim wheel means the transfer and attachment of an assembled rim wheel onto a vehicle axle hub. "Removing" means the opposite of installing.

Mounting a tire means the assembly or putting together of the wheel and tire components to form a rim wheel, including inflation. "Demounting" means the opposite of mounting.

Multi-piece rim wheel means the assemblage of a multi-piece wheel with the tire tube and other components.

Multi-piece wheel means a vehicle wheel consisting of two or more parts, one of which is a side or locking ring designed to hold the tire on the wheel by interlocking components when the tire is inflated.

Restraining device means an apparatus such as a cage, rack, assemblage of bars and other components that will constrain all rim wheel components during an explosive separation of a multi-piece rim wheel, or during the sudden release of the contained air of a single piece rim wheel.

Rim manual means a publication containing instructions from the manufacturer or other qualified organization for correct mounting, demounting, maintenance, and safety precautions peculiar to the type of wheel being serviced.

Rim wheel means an assemblage of tire, tube and liner (where appropriate), and wheel components.

Service or servicing means the mounting and demounting of rim wheels, and related activities such as inflating, deflating, installing, removing, and handling.

Service area means that part of an employer's premises used for the servicing of rim wheels, or any other place where an employee services rim wheels.

OSHA Regulations (continued)

Single piece rim wheel means the assemblage of single piece rim wheel with the tire and other components.

Single piece wheel means a vehicle wheel consisting of one part, designed to hold the tire on the wheel when the tire is inflated.

Trajectory means any potential path or route that a rim wheel component may travel during an explosive separation, or the sudden release of the pressurized air, or an area at which an airblast from a single piece rim wheel may be released. The trajectory may deviate from paths which are perpendicular to the assembled position of the rim wheel at the time of separation or explosion. (See Appendix A for examples of trajectories.)

Wheel means that portion of a rim wheel which provides the method of attachment of the assembly to the axle of a vehicle and also provides the means to contain the inflated portion of the assembly (i.e., the tire and/or tube).

(c) Employee training.

(1) The employer shall provide a program to train all employees who service rim wheels in the hazards involved in servicing those rim wheels and the safety procedures to be followed.

(i) The employer shall assure that no employee services any rim wheel unless the employee has been trained and instructed in correct procedures of servicing the type of wheel being serviced, and in the safe operating procedures described in paragraphs (f) and (g) of this section.

(ii) Information to be used in the training program shall include, at a minimum, the applicable data contained in the charts (rim manuals) and the contents of this standard.

(iii) Where an employer knows or has reason to believe that any of his employees is unable to read and understand the charts or rim manual, the employer shall assure that the employee is instructed concerning the contents of the charts and rim manual in a manner which the employee is able to understand.

(2) The employer shall assure that each employee demonstrates and maintains the ability to service rim wheels safely, including performance of the following tasks:

(i) Demounting of tires (including deflation);

(ii) Inspection and identification of the rim wheel components;

(iii) Mounting of tires (including inflation with a restraining device or other safeguard required by this section);

(iv) Use of the restraining device or barrier, and other equipment required by this section;

(v) Handling of rim wheels;

(vi) Inflation of the tire when a single piece rim wheel is mounted on a vehicle;

(vii) An understanding of the necessity of standing outside the trajectory both during inflation of the tire and during inspection of the rim wheel following inflation; and

(viii) Installation and removal of rim wheels.

(3) The employer shall evaluate each employee's ability to perform these tasks and to service rim wheels safely, and shall provide additional training as necessary to assure that each employee maintains his or her proficiency.

(d) Tire servicing equipment.

(1) The employer shall furnish a restraining device for inflating tires on multi-piece wheels.

(2) The employer shall provide a restraining device or barrier for inflating tires on single piece wheels unless the rim wheel will be bolted onto a vehicle during inflation.

(3) Restraining devices and barriers shall comply with the following requirements:

(i) Each restraining device or barrier shall have the capacity to withstand the maximum force that would be transferred to it during a rim wheel separation occurring at 150 percent of the maximum tire specification pressure for the type of rim wheel being serviced.

(ii) Restraining devices and barriers shall be capable of preventing the rim wheel components from being thrown outside or beyond the device or barrier for any rim wheel positioned within or behind the device;

(iii) Restraining devices and barriers shall be visually inspected prior to each day's use and after any separation of the rim wheel components or sudden release of contained air. Any restraining device or barrier exhibiting damage such as the following defects shall be immediately removed from service:

OSHA Regulations (continued)

(A) Cracks at welds;

(B) Cracked or broken components;

(C) Bent or sprung components caused by mishandling, abuse, tire explosion or rim wheel separation;

(D) Pitting of components due to corrosion; or

(E) Other structural damage which would decrease its effectiveness.

(iv) Restraining devices or barriers removed from service shall not be returned to service until they are repaired and reinspected. Restraining devices or barriers requiring structural repair such as component replacement or rewelding shall not be returned to service until they are certified by either the manufacturer or a Registered Professional Engineer as meeting the strength requirements of paragraph (d)(3)(i) of this section.

(4) The employer shall furnish and assure that an air line assembly consisting of the following components be used for inflating tires:

(i) A clip-on chuck;

(ii) An in-line valve with a pressure gauge or a presettable regulator; and

(iii) A sufficient length of hose between the clip-on chuck and the in-line valve (if one is used) to allow the employee to stand outside the trajectory.

(5) Current charts or rim manuals containing instructions for the type of wheels being serviced shall be available in the service area.

(6) The employer shall furnish and assure that only tools recommended in the rim manual for the type of wheel being serviced are used to service rim wheels.

(e) Wheel component acceptability.

(1) Multi-piece wheel components shall not be interchanged except as provided in the charts or in the applicable rim manual.

(2) Multi-piece wheel components and single piece wheels shall be inspected prior to assembly. Any wheel or wheel component which is bent out of shape, pitted from corrosion, broken, or cracked shall not be used and shall be marked or tagged unserviceable and removed from the service area. Damaged or leaky valves shall be replaced.

(3) Rim flanges, rim gutters, rings, bead seating surfaces and the bead areas of tires shall be free of any dirt, surface rust, scale or loose or flaked rubber build-up prior to mounting and inflation.

(4) The size (bead diameter and tire/wheel widths) and type of both the tire and the wheel shall be checked for compatibility prior to assembly of the rim wheel.

(f) Safe operating procedure - multi-piece rim wheels.

The employer shall establish a safe operating procedure for servicing multi-piece rim wheels and shall assure that employees are instructed in and follow that procedure. The procedure shall include at least the following elements:

(1) Tires shall be completely deflated before demounting by removal of the valve core.

(2) Tires shall be completely deflated by removing the valve core before a rim wheel is removed from the axle in either of the following situations:

(i) When the tire has been driven underinflated at 80% or less of its recommended pressure, or

(ii) When there is obvious or suspected damage to the tire or wheel components.

(3) Rubber lubricant shall be applied to bead and rim mating surfaces during assembly of the wheel and inflation of the tire, unless the tire or wheel manufacturer recommends against it.

(4) If a tire on a vehicle is underinflated but has more than 80% of the recommended pressure, the tire may be inflated while the rim wheel is on the vehicle provided remote control inflation equipment is used, and no employees remain in the trajectory during inflation.

(5) Tires shall be inflated outside a restraining device only to a pressure sufficient to force the tire bead onto the rim ledge and create an airtight seal with the tire and bead.

(6) Whenever a rim wheel is in a restraining device the employee shall not rest or lean any part of his body or equipment on or against the restraining device.

OSHA Regulations
(continued)

(7) After tire inflation, the tire and wheel components shall be inspected while still within the restraining device to make sure that they are properly seated and locked. If further adjustment to the tire or wheel components is necessary, the tire shall be deflated by removal of the valve core before the adjustment is made.

(8) No attempt shall be made to correct the seating of side and lock rings by hammering, striking or forcing the components while the tire is pressurized.

(9) Cracked, broken, bent or otherwise damaged rim components shall not be reworked, welded, brazed, or otherwise heated.

(10) Whenever multi-piece rim wheels are being handled, employees shall stay out of the trajectory unless the employer can demonstrate that performance of the servicing makes the employee's presence in the trajectory necessary.

(11) No heat shall be applied to a multi-piece wheel or wheel component.

(g) Safe operating procedure-single piece rim wheels.

The employer shall establish a safe operating procedure for servicing single piece rim wheels and shall assure that employees are instructed in and follow that procedure. The procedure shall include at least the following elements:

(1) Tires shall be completely deflated by removal of the valve core before demounting.

(2) Mounting and demounting of the tire shall be done only from the narrow ledge side of the wheel. Care shall be taken to avoid damaging the tire beads while mounting tires on wheels. Tires shall be mounted only on compatible wheels of matching bead diameter and width.

(3) Nonflammable rubber lubricant shall be applied to bead and wheel mating surfaces before assembly of the rim wheel, unless the tire or wheel manufacturer recommends against the use of any rubber lubricant.

(4) If a tire changing machine is used, the tire shall be inflated only to the minimum pressure necessary to force the tire bead onto the rim ledge while on the tire changing machine.

(5) If a bead expander is used, it shall be removed before the valve core is installed and as soon as the rim wheel becomes airtight (the tire bead slips onto the bead seat).

(6) Tires may be inflated only when contained within a restraining device, positioned behind a barrier or bolted on the vehicle with the lug nuts fully tightened.

(7) Tires shall not be inflated when any flat, solid surface is in the trajectory and within one foot of the sidewall.

(8) Employees shall stay out of the trajectory when inflating a tire.

(9) Tires shall not be inflated to more than the inflation pressure stamped in the sidewall unless a higher pressure is recommended by the manufacturer.

(10) Tires shall not be inflated above the maximum pressure recommended by the manufacturer to seat the tire bead firmly against the rim flange.

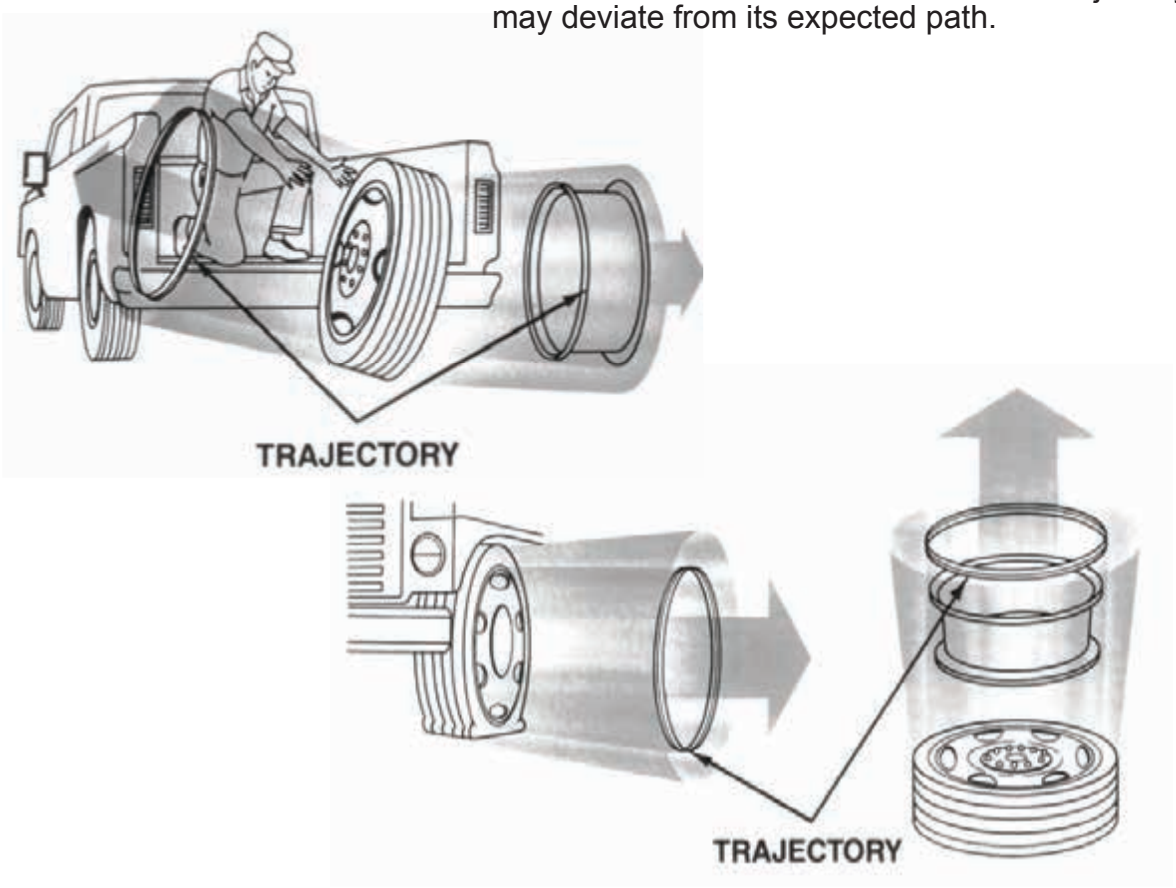
(11) No heat shall be applied to a single piece wheel.

(12) Cracked, broken, bent, or otherwise damaged wheels shall not be reworked, welded, brazed, or otherwise heated.

Appendix A - Trajectory

WARNING: Stay out of trajectory as indicated by shaded area.

NOTE: Under some circumstances the trajectory may deviate from its expected path.



Appendix B - Ordering Information for OSHA Charts

The information on the OSHA charts is available on three posters, or in a manual containing the three charts, entitled “Demounting and Mounting Procedures for Tubeless Truck and Bus Tires,” “Demounting and Mounting Procedures for Tube-Type Truck and Bus Tires,” and “Multi-piece Rim Matching Chart.” Interested parties can download and print both the manuals and posters from OSHA’s Web site at http://www.osha.gov/publications (and type “tire chart” in the search field). However, when used by the employer at a worksite to provide information to employees, the printed posters must be, at a minimum, 2 feet wide and 3 feet long.

Copies of the manual also are available from the Occupational Safety and Health Administration (OSHA Office of Publications, Room N-3101, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210; telephone: (202) 693-1888; or fax: (202) 693-2498).

[49 FR 4350, Feb. 3, 1984; as amended at 52 FR 36026, Sept. 25, 1987; 53 FR 34737, Sept. 8, 1988; 61 FR 9227, March 7, 1996; 76 FR 80739, Dec. 27, 2011]

7 Glossary of Terms

Glossary of Common Terms

7-1

AIR CHAMBER - The area in a mounted tire and rim assembly that contains the air.

BACKUP DIAMETER - Hub attachment face diameter that mounts to the wheel.

BEAD SEAT - The tire seating surface of the rim.

BOLT CIRCLE - The circle defined by the centers of the bolt holes (stud holes) of a wheel, dimensions stated in diameter inches or millimeters.

BOLT HOLE - A hole in a disc wheel for attachment fasteners.

BORE - See “HUB BORE.”

DISC - The center member of a disc wheel.

DISC FACE - The flat central portion of a disc wheel in which the bolt holes are located and which contacts the drum, hub or mating wheel.

DISC WHEEL - A rim combined with a center disc which has bolt holes for attaching to a vehicle.

DOUBLE CAP NUTS - Two wheel nuts used in stud-piloted wheel systems. They include inner cap nuts used to fasten inner wheels to a vehicle and outer cap nuts used to fasten single wheels and outer wheels to a vehicle. These nuts have both right and left hand threads and have ball seats that fit into the wheel ball, and ball seat bolt holes to center and clamp the wheels on the hub.

DROP CENTER - The well or center portion of the wheel rim.

DUAL WHEEL / DUALABLE- Any wheel that can be mated disc side to disc side with another wheel resulting in an inner and outer dual wheel assembly.

FLANGE NUT - A nut with a flat face or flange that bears against the wheel; can be one-piece or multi-piece construction. Use on hub piloted wheels.

FOOT-POUNDS - The measure of the amount of torque applied to a cap nut or other part. May be measured with a torque wrench.

HUB BORE - **(Bore)** The large hole in the middle of a disc wheel.

HALF DUAL SPACING - The distance from the outside disc face (surface between the wheels as a dual assembly) to the center of the rim.

HUB PILOTED MOUNTING - A wheel mounting system in which location of the wheel is accomplished by positioning the wheel center hole on a machined pilot, (continuous or interrupted) on the hub. Fastening is accomplished by flange nuts bearing against the flat face of the wheel disc.

HUB PILOTS - Pads on the hub to locate the center hole of a hub-piloted wheel.

in. - Abbreviation for inches.

I**NNER CAP NUT** - The ball seat nut used to install the inner stud-piloted dual wheel to a vehicle. (see Double cap nut)

INSET - The distance from the wheel mounting surface to the rim centerline when the centerline is placed inboard of the mounting surface.

kg - Abbreviation for kilogram (weight measurement), equal to 1000 grams.

kPa - Abbreviation for kilo Pascals (pressure measurement).

MAXIMUM INFLATION - The highest amount of air pressure allowed, measured at normal ambient temperatures.

mm - Abbreviation for millimeters.

NAVE - See “DISC FACE.”

N-m - Abbreviation for Newton meters

OFFSET - See “OUTSET.”

Glossary of Common Terms (continued)

OPEN SIDE - The side of the wheel opposite the disc face.

OSHA - Abbreviation for the U.S. Department of Labor, Occupational Safety and Health Administration.

OUTER CAP NUT - The ball seat nut used to install the outer wheel of a stud-piloted dual assembly or a single stud-piloted wheel to a vehicle. The outer nut screws onto the inner cap is a dual assembly. (see Double Cap Nut).

OUTSET - The distance from the mounting surface of the wheel to the rim centerline when the rim centerline is mounted outboard of the hub face. This dimension is the same as the 1/2 DUAL SPACING dimension.

PILOT PAD - See "HUB PILOTS".

PSI - Abbreviation for pounds per square inch.

REVERSIBLE - Term applied to a disc wheel which can be reversed on the hub without changing the position of the tire centerline.

RIM - That portion of the wheel which supports the tire.

RIM CENTERLINE - A line to the radial axis of the wheel running through the mid point between the rim flanges.

RIM FLANGE - The edge of a rim that has a larger diameter that the tire bead designed to support the tire.

SINGLE CAP NUT - A cap nut used to secure single wheels or outer dual wheels.

STUD - A threaded bolt that is used with wheel nuts to fasten wheels or rims to a vehicle.

STUD-PILOTED MOUNTING - A wheel mounting system in which location and fastening of the wheel are both accomplished by nuts which fit corresponding studs at each wheel bolt hole..

TIRE BEAD - That surface of the tire which contacts the angled surface of the wheel rim.

TORQUE - Rotational force to measure nut tightness.

WHEEL MOUNTING FACE - See "DISC FACE".

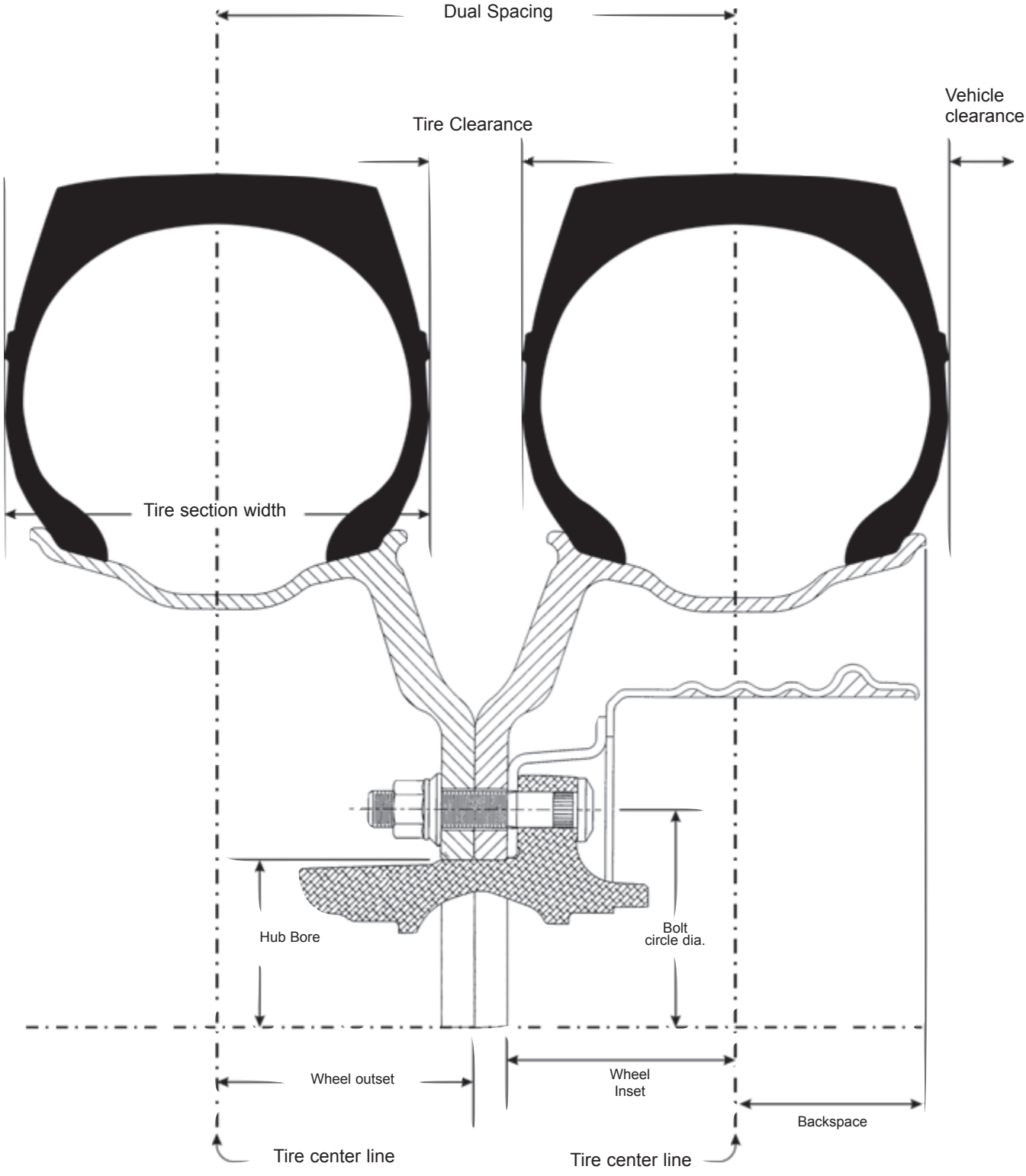
wt. - Abbreviation for weight.

Wheel measurement

7-2

How to measure minimum dual spacing

Minimum dual spacing measurement is determined by the tire manufacturer and may be obtained from the tire manufacturer's handbook. To determine if the Alcoa aluminum dual wheel assembly has adequate minimum dual spacing for the selected tires, double the wheel outset measurement of the Alcoa wheel used. If the doubled outset measurement is equal to or greater than the tire manufacturer's recommendation, there will be sufficient minimum dual spacing. Wheel inset and outset is given for each Alcoa wheel in Alcoa's Wheel Product Spec Guide. Both inset and outset wheels are measured from the mounting surface of the wheel to the center line of the rim. Maintaining proper tire inflation and load ratings are essential to maintaining proper minimum dual spacing.



7

8 Conversion Tables

Inch Fraction, Decimal and Millimeter Equivalents Chart (Up to 1 inch)

8-1

Inches	Decimals	Millimeters
1/64	0.016	0.40
1/32	0.031	0.79
3/64	0.047	1.19
1/16	0.063	1.59
5/64	0.078	1.98
3/32	0.094	2.38
7/64	0.109	2.78
1/8	**0.125**	**3.18**
9/64	0.141	3.57
5/32	0.156	3.97
11/64	0.172	4.37
3/16	0.188	4.76
13/64	0.203	5.16
7/32	0.219	5.56
15/64	0.234	5.95
1/4	**0.250**	**6.35**
17/64	0.266	6.75
9/32	0.281	7.14
19/64	0.297	7.54
5/16	0.313	7.94
21/64	0.328	8.33
11/32	0.344	8.73
23/64	0.359	9.13
3/8	**0.375**	**9.53**
25/64	0.391	9.92
13/32	0.406	10.32
27/64	0.422	10.72
7/16	0.438	11.11
29/64	0.453	11.51
15/32	0.469	11.91
31/64	0.484	12.30
1/2	**0.500**	**12.70**

Inches	Decimals	Millimeters
33/64	0.516	13.10
17/32	0.531	13.49
35/64	0.547	13.89
9/16	0.563	14.29
37/64	0.578	14.68
19/32	0.594	15.08
39/64	0.609	15.48
5/8	**0.625**	**15.88**
41/64	0.641	16.27
21/32	0.656	16.67
43/64	0.672	17.07
11/16	0.688	17.46
45/64	0.703	17.86
23/32	0.719	18.26
47/64	0.734	18.65
3/4	**0.750**	**19.05**
49/64	0.766	19.45
25/32	0.781	19.84
51/64	0.797	20.24
13/16	0.813	20.64
53/64	0.828	21.03
27/32	0.844	21.43
55/64	0.859	21.83
7/8	**0.875**	**22.23**
57/64	0.891	22.62
29/32	0.906	23.02
59/64	0.922	23.42
15/16	0.938	23.81
61/64	0.953	24.21
31/32	0.969	24.61
63/64	0.984	25.00
1	**1.000**	**25.40**

Conversion Factors

8-2

Inches to Millimeters

Inches	x	25.4	=	Millimeters

Millimeters to Inches

Millimeters	x	0.03937	=	Inches

PSI to kPa

PSI	x	6.8948	=	kPa

kPa to PSI

kPa	x	0.145	=	PSI

Pounds to Kilograms

Pounds	x	0.4536	=	kg

Kilograms to Pounds

kg	x	2.2046	=	Pounds

Foot-pounds to Newton Meters

Ft-lbs	x	1.3558	=	N-m

Newton Meters to Foot-pounds

N-m	x	.73756	=	Ft-lbs

Alcoa Wheel Products
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(800) 242-9898

www.alcoawheels.com

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